

EXHIBIT 1

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

INVENSAS CORPORATION and TESSERA)	
ADVANCED TECHNOLOGIES, INC.,)	
	)	No. 1:19-cv-00861-RGA
Plaintiffs,)	
	)	JURY TRIAL DEMANDED
v.)	
	)	FILED UNDER SEAL
NVIDIA CORPORATION, NVIDIA)	
SINGAPORE PTE. LTD., and NVIDIA	)	CONTAINS RESTRICTED –
INTERNATIONAL, INC.,	)	OUTSIDE ATTORNEYS’ EYES
	)	ONLY INFORMATION
Defendants.)	

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiffs Invensas Corporation and Tessera Advanced Technologies, Inc. (collectively “Plaintiffs”) bring this complaint for patent infringement against Defendant NVIDIA Corporation, Defendant NVIDIA Singapore Pte. Ltd., and Defendant NVIDIA International, Inc. (collectively “NVIDIA” or “Defendants”). Plaintiffs, on personal knowledge as to their own acts, and on information and belief as to all others based on investigation, allege as follows:

NATURE OF THE ACTION

1. This is a civil action for infringement of United States Patent Nos. 6,232,231 (“the ‘231 patent”), 6,849,946 (“the ‘946 patent”), 7,064,005 (“the ‘005 patent”), and 6,317,333 (“the ‘333 patent”) (collectively, the “Asserted Patents”) under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*

THE PARTIES

2. Plaintiff Invensas Corporation is a Delaware corporation with its principal place of business at 3025 Orchard Parkway, San Jose, California 95134.

3. Plaintiff Tessera Advanced Technologies, Inc. is a Delaware corporation with its principal place of business at 3025 Orchard Parkway, San Jose, California 95134.

4. Defendant NVIDIA Corporation is a Delaware corporation with its principal place of business at 2788 San Tomas Expressway, Santa Clara, California 95051. NVIDIA Corporation may be served through its registered agent, Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808.

5. On information and belief, Defendant NVIDIA Singapore Pte. Ltd. (“NVIDIA Singapore”) is an entity organized under the laws of Singapore with its principal place of business located at 3/F Harbour View 1, No. 12 Science Park East Avenue, HK Science Park, Shatin, Hong Kong. On information and belief, NVIDIA Singapore may be served at its registered office, which is located at 112 Robinson Road, #05-01, Singapore 068902.

6. On information and belief, Defendant NVIDIA International, Inc. (“NVIDIA International”) is an entity organized under the laws of the Cayman Islands. On information and belief, NVIDIA International may be served through its registered agent, Genesis Trust & Corporate Services Ltd., which maintains a mailing address of P.O. Box 448, Elgin Court, Elgin Avenue, George Town, Grand Cayman KY1-1106, Cayman Islands.

7. On information and belief, NVIDIA Corporation wholly owns NVIDIA International, Inc., which wholly owns NVIDIA Singapore Pte. Ltd.

JURISDICTION AND VENUE

8. The Court has subject matter jurisdiction over the matters pleaded herein under 28 U.S.C. §§ 1331 and 1338(a) and the patent laws of the United States, 35 U.S.C. § 1, *et seq.*

NVIDIA Corporation

9. The Court has personal jurisdiction over NVIDIA Corporation at least because NVIDIA Corporation is organized and exists under the laws of the State of Delaware. On

information and belief, NVIDIA Corporation has regularly and systematically transacted business in and with residents of the State of Delaware, directly or through intermediaries, and/or committed acts of infringement in the State of Delaware as alleged more particularly below. NVIDIA Corporation has also placed infringing products into the stream of commerce by shipping those products into the State of Delaware or by knowing that the products would be shipped into the State of Delaware. Plaintiffs' causes of action arise, at least in part, from NVIDIA Corporation's contacts with and activities in the State of Delaware.

10. Venue is proper in this judicial district pursuant to 28 U.S.C. §§ 1400 and 1391(b) and (c) because NVIDIA Corporation, as a Delaware corporation, resides in this judicial district. In addition, NVIDIA Corporation has committed acts of infringement in the State of Delaware, including by selling and distributing infringing products in the State of Delaware.

NVIDIA Singapore Pte. Ltd.

Personal Jurisdiction Under Delaware Long-Arm Statute/Stream of Commerce

11. This Court has personal jurisdiction over NVIDIA Singapore pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the "dual jurisdiction" or "stream of commerce" test, as explained below.

12. Under the stream of commerce test, personal jurisdiction is established over a foreign defendant such as NVIDIA Singapore by showing three things: (1) an intent to serve the Delaware market; (2) the introduction of products into the market as a result of this intent; and (3) that Plaintiffs' cause of action arises from injuries caused by those products. *3G Licensing, S.A. v. HTC Corp.*, No. 17-cv-83-LPS-CJB, 2017 WL 6442101, at *2 (D. Del. Dec. 18, 2017). As to the first prong, a non-resident firm's "intent to serve the United States market is sufficient to establish an intent to serve the Delaware market, unless there is evidence that the firm intended to exclude from its marketing and distribution efforts some portion of the country that

includes Delaware.” *Enzo Life Scis., Inc. v. Hologic Inc.*, No. 16-cv-894-LPS-CJB, 2018 WL 4660355, at *3 n.5 (D. Del. Sept. 26, 2018) (quoting *Robert Bosch LLC v. Albersee Prod., Inc.*, 70 F. Supp. 3d 665, 675 (D. Del. 2014)).

First Prong: Intent to Serve the United States Market, Including Delaware

13. On information and belief, during the time period relevant to this lawsuit, including from at least 2013 to 2018, NVIDIA Singapore intended to serve the United States market with products, including computer graphics cards comprising NVIDIA graphics processing units (“GPUs”) and NVIDIA SHIELD tablet and SHIELD TV products comprising NVIDIA Tegra systems-on-a-chip (“SoCs”). As explained below, Plaintiffs accuse these products of infringing the Asserted Patents. *See infra* ¶¶ 66–72, 80–81, 89–90, 98–99, 105, 113–114, 120–121, 128–129, 135.

14. NVIDIA Singapore’s intent to serve the United States market, including Delaware, is demonstrated by the fact that from 2013 through 2018, NVIDIA Singapore shipped several tons of products from Hong Kong to the United States. NVIDIA Singapore’s U.S. affiliate NVIDIA Corporation received these shipments in the United States. Importation records describe these shipments as containing computer graphics cards and Shield products, as summarized in the table below.

Year	Shipper	Consignee	Description	Shipments
2013	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	3
2014	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	10
2015	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	1
2016	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	3
2017	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	2
			Shield	2
2018	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Shield	1
Total:				22

See Exs. F–K (U.S. importation records from 2013 through 2018).

15. The total reported weight of these 22 shipments is 53,759 kilograms, which is about 118,518 pounds or 59 tons. On information and belief, NVIDIA Singapore has made additional shipments to the United States of computer graphics cards and SHIELD products beyond those summarized in the table above.

16. NVIDIA Singapore's intent to serve the United States market, including Delaware, is also demonstrated by the fact that, on information and belief, the primary purpose of NVIDIA Singapore is to sell NVIDIA products worldwide, and U.S. consumers account for a significant portion of the worldwide demand for NVIDIA products sold by NVIDIA Singapore. NVIDIA Singapore has repeatedly stated in its annual financial statements that "[t]he principal activity of the Company consists of sales of graphics processors and media and communication devices." *See, e.g.*, Ex. L at 10 (financial statement for fiscal year ending January 25, 2015); Ex. M at 8 (financial statement for fiscal year ending January 31, 2016). Furthermore, as summarized in the table below, NVIDIA Singapore generates the vast majority of all revenue reported by NVIDIA Corporation on a consolidated basis:

Fiscal Year Ending In	NVIDIA Singapore Revenue	NVIDIA Corporation Revenue (Consolidated) (Ex. Q at 23)
2015	\$ 3,885,594,000 (Ex. L at 6)	\$ 4,682,000,000
2016	\$ 4,077,896,000 (Ex. M at 4)	\$ 5,010,000,000
2017	\$ 5,712,400,000 (Ex. N at 5)	\$ 6,910,000,000
2018	\$ 8,064,722,000 (Ex. O at 5)	\$ 9,714,000,000
2019	\$ 9,727,059,000 (Ex. P at 5)	\$ 11,716,000,000
Total:	\$ 31,467,671,000	\$ 38,032,000,000

17. During the five fiscal years summarized above, NVIDIA Corporation reported roughly \$38 billion in worldwide revenue on a consolidated basis, and NVIDIA Singapore reported roughly \$31.5 billion in revenue. In other words, NVIDIA Singapore generated roughly 83 percent of NVIDIA Corporation's worldwide revenue. NVIDIA Singapore's outside role in

generating revenue for NVIDIA Corporation demonstrates an intent by NVIDIA Singapore to serve the United States market because, on information and belief, U.S. consumers provide a significant portion of the worldwide demand for NVIDIA products sold by NVIDIA Singapore.

18. NVIDIA Singapore's intent to serve the United States market, including Delaware, is also demonstrated by the fact that in 2014, in the midst of shipping accused products to the United States, [REDACTED] to a protected communications agreement ("PCA") with Plaintiffs' U.S.-based parent company, Xperi (formerly known as Tessera). The PCA demonstrates an intent to serve the United States market because Xperi licenses U.S. patents that are relevant to the products that NVIDIA Singapore has sold and has shipped to the United States. Additionally, the PCA demonstrates an intent to serve the United States market because it provides that any disputes arising out of the PCA are to be decided in Delaware applying Delaware law, and not in Singapore or Hong Kong. *See* D.I. 51 (9/17/2019 Hr'g Tr.) at 13:16–18.

19. Finally, NVIDIA Singapore’s intent to serve the United States market, including Delaware, is demonstrated by the fact that, as summarized in the table below, three of its four directors reside in the United States (rather than in Singapore or Hong Kong) and also work for NVIDIA Corporation, which is based in the United States and incorporated in Delaware. Furthermore, one of NVIDIA Singapore’s directors, Michael John Byron, is specifically “engaged in sales and marketing and/or finance for the Accused Products” at NVIDIA Corporation. D.I. 19 (8/20/2019 Declaration of Joseph Greco) ¶ 12.

NVIDIA Singapore Director	Country of Residence	Position at NVIDIA Corp.
Michael John Byron	United States	Vice President, Finance Operations and Systems
Karen Theresa Burns	United States	Vice President, Finance
Rebecca Peters	United States	Vice President, Corporate Affairs

Ex. R at 5 (NVIDIA Singapore Corporate Compliance and Financial Profile).

20. On information and belief, NVIDIA Singapore has not excluded any portion of the United States that includes Delaware from its efforts to sell and ship products to the United States that comprise NVIDIA GPUs and Tegra SoCs.

21. In sum, during the time period relevant to this case, NVIDIA Singapore has intended to serve the United States market, including Delaware, because on information and belief (1) NVIDIA Singapore has shipped several tons of products to the United States comprising NVIDIA GPUs and Tegra SoCs, (2) NVIDIA Singapore has generated the vast majority of NVIDIA Corporation’s worldwide revenue, much of which is attributable to demand for NVIDIA products by U.S. consumers, (3) [REDACTED] a PCA with Plaintiffs’ U.S.-based parent company, and the PCA provides that any disputes arising under the PCA are to be decided in Delaware under Delaware law, (4) most of NVIDIA Singapore’s directors are U.S. residents who also work for NVIDIA Corporation, and (5) NVIDIA Singapore

has not sought to exclude any portion of the United States that includes Delaware from its efforts to sell and ship products to the United States.

Second Prong: Introduction of Products Into the United States Market

22. On information and belief, NVIDIA Singapore's intent to serve the United States market resulted in the introduction of products into the United States market, including in Delaware.

23. For example, on information and belief, computer graphics cards comprising infringing NVIDIA GPUs have been sold nationwide at Best Buy stores. A page on NVIDIA Corporation's website lists dozens of models and describes them as having been "sold at NVIDIA.com and Best Buy." Ex. S.

24. On information on belief, Best Buy has maintained and continues to maintain several stores in Delaware, including in Wilmington at 4807 Concord Pike (Ex. T), in Dover at 1165 N. Dupont Hwy (Ex. U), and in Newark at 2700 Fashion Center Blvd. (Ex. V).¹

25. On information and belief, computer graphics cards containing infringing NVIDIA GPUs were shipped to the United States by NVIDIA Singapore, received by NVIDIA Corporation, and then sold at Best Buy locations in Delaware. For example, in November 2016, Best Buy's website advertised the GeForce GTX 980 graphics card as "ON SALE" and included a link for consumers to "Check Stores" for the graphics card. Ex. W. As previously noted, NVIDIA Singapore sent three shipments to the United States in 2016 that were described as containing computer graphics cards. *See supra* ¶ 14.

¹ The foregoing exhibits each consist of a current website print-out reflecting Best Buy operations today, as well as a historical version of the same website from the Wayback Machine showing Best Buy stores at the same locations in 2015 or 2016. *See* Exs. T–V.

26. On information and belief, products containing infringing NVIDIA Tegra SoCs were shipped to the United States by NVIDIA Singapore, received by NVIDIA Corporation, and then sold at Best Buy locations in Delaware. For example, in January 2017, Best Buy’s website advertised the NVIDIA SHIELD K1 tablet. Ex. X. As previously noted, NVIDIA Singapore sent two shipments to the United States in 2017 that were described as containing SHIELD products. *See supra* ¶ 14.

Third Prong: Cause of Action Arises from Injuries Caused by Products

27. Plaintiffs’ cause of action for infringement of the Asserted Patents arises from injuries caused by products introduced to the United States market, including Delaware, as a result of NVIDIA Singapore’s intent to serve the United States market, including Delaware. As explained further below, Plaintiffs allege that NVIDIA GPUs and NVIDIA SoCs infringe the Asserted Patents. *See infra* ¶¶ 66–72, 80–81, 89–90, 98–99, 105, 113–114, 120–121, 128–129, 135. Unlicensed usage, offers for sale, and sales of these products in the United States, and unlicensed importation of these products into the United States, injured Plaintiffs.

28. In sum, this Court has personal jurisdiction over NVIDIA Singapore pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the stream of commerce test.

Personal Jurisdiction Under Fed. R. Civ. P. 4(k)(2)

29. Alternatively, this Court has personal jurisdiction over NVIDIA Singapore pursuant to the federal long-arm statute, Fed. R. Civ. P. 4(k)(2).²

² Pleading personal jurisdiction alternatively under Rule 4(k)(1) and Rule 4(k)(2) is proper under Fed. R. Civ. P. 8(d). *See Touchcom, Inc. v. Bereskin & Parr*, 574 F.3d 1403, 1415 (Fed. Cir. 2009) (analyzing application of Fed. R. Civ. P. 4(k)(2) and noting that “[a]n approach that forecloses alternative arguments appears to conflict with the Federal Rules of Civil Procedure”).

30. Rule 4(k)(2) allows “ ‘a court to exercise personal jurisdiction over a defendant if (1) the plaintiff’s claim arises under federal law, (2) the defendant is not subject to jurisdiction in any state’s courts of general jurisdiction, and (3) the exercise of jurisdiction comports with due process.’ ” *Bos. Sci. Corp. v. Micro-Tech Endoscopy USA Inc.*, No. 18-cv-1869-CFC-CJB, 2020 WL 229993, at *4 (D. Del. Jan. 15, 2020) (quoting *M-I Drilling Fluids UK Ltd. v. Dynamic Air Ltda.*, 890 F.3d 995, 999 (Fed. Cir. 2018)), *report and recommendation adopted*, No. 18-cv-1869-CFC-CJB, 2020 WL 564935 (D. Del. Feb. 5, 2020). “ ‘The third requirement under Rule 4(k)(2)—the due process analysis—contemplates a defendant’s contacts with the entire United States, as opposed to the state in which the district court sits.’ ” *Id.* (same). Rule 4(k)(2) is meant to allow a district court to exercise personal jurisdiction over a foreign defendant whose contacts with the United States, but not with the forum state, satisfy due process. *Id.* (citing *M-I Drilling*, 890 F.3d at 999).

First Prong: Plaintiffs’ Claims Arise Under Federal Law

31. Plaintiffs allege that NVIDIA Singapore is liable for patent infringement pursuant to 35 U.S.C. § 271. Thus, Plaintiffs’ claims arise under federal law.

Second Prong: Not Subject to Jurisdiction in Any State’s Courts of General Jurisdiction

32. On information and belief, NVIDIA Singapore is incorporated in Singapore, maintains its principal place of business in Hong Kong, and does not maintain any offices or subsidiaries in the United States. On information and belief, NVIDIA Singapore is not subject to jurisdiction in any state’s courts of general jurisdiction.

Third Prong: Due Process

33. In analyzing due process in connection with Rule 4(k)(2), courts consider whether (1) the defendant purposefully directed its activities at residents of the United States, (2) the

claim arises out of or relates to the defendant's activities with the United States, and (3) assertion of personal jurisdiction is reasonable and fair. *Bos. Sci. Corp.*, 2020 WL 229993, at *6.

34. NVIDIA Singapore purposefully directed its activities at residents of the United States. First, as explained above on information and belief in paragraphs 14–15 and 23–26, which are incorporated by reference, over a period of several years NVIDIA Singapore regularly shipped tons of products, including accused products, to its affiliate in the United States, NVIDIA Corporation. These products were then sold nationwide, including, for example, at Best Buy. Second, as explained above on information and belief in paragraphs 16–17, which are incorporated by reference, NVIDIA Singapore generates the vast majority of revenue for NVIDIA Corporation, which is incorporated in and based in the United States, and U.S. consumers provide a significant portion of worldwide demand for NVIDIA products sold by NVIDIA Singapore. Third, as explained above on information and belief in paragraph 18, which is incorporated by reference, in the midst of shipping accused products to the United States in 2014, [REDACTED] a PCA with Plaintiffs' U.S.-based parent company Xperi, and under the PCA, any disputes arising out of the PCA are to be decided in Delaware and applying Delaware law. Fourth and finally, as explained above on information and belief in paragraph 19, which is incorporated by reference, most of NVIDIA Singapore's directors reside in the United States and also work for NVIDIA Corporation, which is based in the United States.

35. Plaintiffs' infringement claims against NVIDIA Singapore arise out of or relate to NVIDIA Singapore's activities with the United States. In particular, NVIDIA Singapore sold products that are accused in this case and also shipped accused products to the United States. The unlicensed use, sale, and offer for sale of these accused products in the United States, and

unlicensed importation of them into the United States, provide the basis for Plaintiffs' infringement claims.

36. Assertion of personal jurisdiction over NVIDIA Singapore is reasonable and fair. Any burden on NVIDIA Singapore is sufficiently outweighed by the interest of the United States in adjudicating Plaintiffs' claims, which are based on infringement of U.S. patents, and by the interests of Plaintiffs in obtaining effective and convenient relief. *Bos. Sci. Corp.*, 2020 WL 229993, at *7–*8.

37. In sum, this Court alternatively has personal jurisdiction over NVIDIA Singapore pursuant to Fed. R. Civ. P. 4(k)(2).

Venue

38. When a foreign defendant is sued in a patent infringement action, 28 U.S.C. § 1391 governs venue. *See 3G Licensing*, 2017 WL 6442101, at *2. Under § 1391, a foreign defendant may be sued in any judicial district. *See* 28 U.S.C. § 1391(c)(3). On information and belief, NVIDIA Singapore is incorporated in Singapore. NVIDIA Singapore is a foreign defendant that may be sued in any judicial district. Therefore, venue is proper here in the District of Delaware.

NVIDIA International, Inc.

Personal Jurisdiction Under Delaware Long-Arm Statute/Stream of Commerce

39. This Court has personal jurisdiction over NVIDIA International, Inc. pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the stream of commerce test, as explained below.

First Prong: Intent to Serve the United States Market, Including Delaware

40. On information and belief, during the time period relevant to this lawsuit, NVIDIA International intended to serve the United States market with products, including

computer graphics cards comprising NVIDIA GPUs and/or NVIDIA SHIELD tablet and SHIELD TV products comprising NVIDIA Tegra SoCs.

41. Specifically, in connection with this lawsuit, counsel for NVIDIA Corporation represented to Plaintiffs that (1) [REDACTED] and that (2) [REDACTED] [REDACTED] . Ex. Y (4/13/2020 Email from C. Williamson); D.I. 136 (4/29/2020 Joint Discovery Letter Brief) at 5, 6.

42. Based on this information from NVIDIA Corporation's counsel, Plaintiffs allege on information and belief that during the time period relevant to this lawsuit, [REDACTED] [REDACTED] . These actions demonstrate an intent by NVIDIA International to serve the United States market, including Delaware.

43. NVIDIA International's intent to serve the United States market, including Delaware, is also demonstrated by the fact that [REDACTED] [REDACTED] to the 2014 protected communications agreement (PCA) with Plaintiffs' U.S.-based parent company, Xperi. The PCA demonstrates an intent to serve the United States market because Xperi licenses U.S. patents that are relevant [REDACTED] [REDACTED] . Additionally, [REDACTED] [REDACTED] PCA with Xperi demonstrates an intent to serve the United States market because it provides that any disputes arising out of the PCA are to be decided in Delaware applying Delaware law, and not in the Cayman Islands.

44. NVIDIA International’s intent to serve the United States, including Delaware, is also demonstrated by the fact that, on information and belief, NVIDIA International wholly owns—and is wholly owned by—entities that intend to serve the United States market, including Delaware. Specifically, NVIDIA International wholly owns NVIDIA Singapore, which for the reasons explained above, intends to serve the United States market, including Delaware. *See* Ex. P at 35 (NVIDIA Singapore 2019 financial statement) (“The Company’s immediate holding corporation is Nvidia International Inc., incorporated in the Cayman Islands.”); *see supra* ¶¶ 13–37 (allegations describing activities of NVIDIA Singapore). Additionally, NVIDIA International is wholly owned by NVIDIA Corporation, which is based in the United States, imports accused products into the United States, and markets and sells accused products throughout the United States.

45. NVIDIA International’s intent to serve the United States, including Delaware, is also demonstrated by the fact that, on information and belief, one of NVIDIA International’s directors, Karen Burns, resides in the United States (not in the Cayman Islands) and also works for NVIDIA Corporation as its vice president of finance, and also serves as a director of NVIDIA Singapore. As previously mentioned, both NVIDIA Corporation and NVIDIA Singapore intend to serve the United States, including Delaware. Ms. Burns’ common involvement in all three entities demonstrates that NVIDIA International intends to serve the United States market, including Delaware, just like NVIDIA Singapore and NVIDIA Corporation.³

³ Ms. Burns’ involvement as a director of NVIDIA International, Inc. was revealed in 2017 as part of the “Paradise Papers,” which include leaked documents related to offshore companies in tax havens like the Cayman Islands. *See* <https://offshoreleaks.icij.org/nodes/101418482>

46. On information and belief, NVIDIA International has not excluded any portion of the United States that includes Delaware from [REDACTED]

47. In sum, during the time period relevant to this case, NVIDIA International has intended to serve the United States market, including Delaware, because on information and belief (1) [REDACTED], (2) [REDACTED] to a PCA with Plaintiffs' U.S.-based parent company, which provides that any disputes arising under the PCA are to be decided in Delaware under Delaware law, (3) NVIDIA International wholly owns, and is wholly owned by, affiliated entities that intend to serve the United States market, (4) one of NVIDIA International's directors holds the same position at NVIDIA Singapore (a frequent shipper of NVIDIA products to the United States) and also works for NVIDIA Corporation in the United States, and (5) NVIDIA International has not sought to exclude any portion of the United States that includes Delaware from [REDACTED].

Second Prong: Introduction of Products Into the United States Market

48. On information and belief, NVIDIA International's intent to serve the United States market resulted in the introduction of products into the United States market, including in Delaware.

49. As explained above on information and belief in connection with NVIDIA Singapore in paragraphs 22–26, which are incorporated by reference, accused products have been sold nationwide at Best Buy, including computer graphics cards with infringing NVIDIA GPUs and NVIDIA SHIELD products with infringing Tegra SoCs. Best Buy has maintained and

continues to maintain multiple stores in Delaware, and, on information and belief, accused products have been sold at these stores.

50. On information and belief, [REDACTED] include NVIDIA computer graphics cards and SHIELD products that were sold at Best Buy locations in Delaware.

Third Prong: Cause of Action Arises from Injuries Caused by Products

51. Plaintiffs' cause of action for infringement of the Asserted Patents arises from injuries caused by products introduced to the United States market, including Delaware, as a result of NVIDIA International's intent to serve the United States market, including Delaware. As explained further below, Plaintiffs allege that NVIDIA GPUs and NVIDIA SoCs infringe the Asserted Patents. *See infra* ¶¶ 66–72, 80–81, 89–90, 98–99, 105, 113–114, 120–121, 128–129, 135. Unlicensed usage, offers for sale, and sales of these products in the United States, and unlicensed importation of these products into the United States, injured Plaintiffs.

52. In sum, this Court has personal jurisdiction over NVIDIA International pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the stream of commerce test.

Personal Jurisdiction Under Fed. R. Civ. P. 4(k)(2)

53. Alternatively, this Court has personal jurisdiction over NVIDIA International pursuant to the federal long-arm statute, Fed. R. Civ. P. 4(k)(2).

First Prong: Plaintiffs' Claims Arise Under Federal Law

54. Plaintiffs allege that NVIDIA International is liable for patent infringement pursuant to 35 U.S.C. § 271. Thus, Plaintiffs' claims arise under federal law.

Second Prong: Not Subject to Jurisdiction in Any State's Courts of General Jurisdiction

55. On information and belief, NVIDIA International is incorporated in the Cayman Islands and does not maintain any offices or subsidiaries in the United States. On information

and belief, NVIDIA International is not subject to jurisdiction in any state's courts of general jurisdiction.

Third Prong: Due Process

56. NVIDIA International purposefully directed its activities at residents of the United States. First, as explained above on information and belief in paragraphs 41–42 and 48–50, which are incorporated by reference, [REDACTED]
[REDACTED]
[REDACTED]. Second, as explained above on information and belief in paragraph 43, which is incorporated by reference, in 2014, [REDACTED] to a PCA with Plaintiffs' U.S.-based parent company Xperi, and the PCA provides that any disputes arising out of the PCA are to be decided in Delaware and by applying Delaware law. Third, as explained above on information and belief in paragraph 44, which is incorporated by reference, NVIDIA International wholly owns, and is wholly owned by, affiliated entities that intend to serve the United States market. Fourth and finally, as explained above on information and belief in paragraph 45, which is incorporated by reference, NVIDIA International's director Ms. Karen Burns also serves as a director for NVIDIA Singapore, which has shipped tons of products to the United States, and she resides in the United States and works for NVIDIA Corporation, which is based in and serves the United States.

57. Plaintiffs' infringement claims against NVIDIA International arise out of or relate to NVIDIA International's activities with the United States. In particular, [REDACTED]
[REDACTED]
[REDACTED]. The unlicensed use, sale, and offer for sale of these accused products in the United

States, and unlicensed importation of them into the United States, provide the basis for Plaintiffs' infringement claims.

58. Assertion of personal jurisdiction over NVIDIA International is reasonable and fair. Any burden on NVIDIA International is sufficiently outweighed by the interest of the United States in adjudicating Plaintiffs' claims, which are based on infringement of U.S. patents, and by the interests of Plaintiffs in obtaining effective and convenient relief.

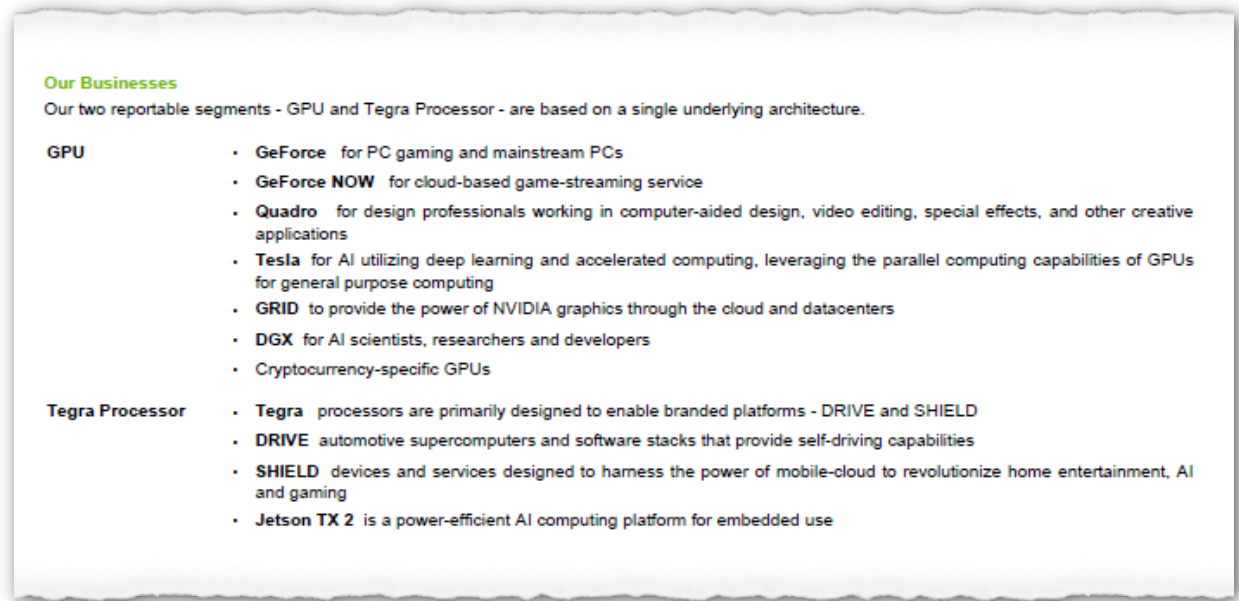
59. In sum, this Court alternatively has personal jurisdiction over NVIDIA International pursuant to Fed. R. Civ. P. 4(k)(2).

Venue

60. On information and belief, NVIDIA International, Inc. is incorporated in the Cayman Islands. NVIDIA International is a foreign defendant that may be sued in any judicial district. *See* 28 U.S.C. § 1391(c)(3). Therefore, venue is proper here in the District of Delaware.

NVIDIA'S INFRINGING PRODUCTS AND ACTIVITIES

61. NVIDIA Corporation, including its subsidiaries NVIDIA Singapore and NVIDIA International, is a global supplier of graphics processing units ("GPUs") and system-on-a-chip processors (SoCs) that incorporate GPUs and multi-core CPUs to drive supercomputing. *See* 2018 NVIDIA Corporation Form 10-K, p. 23. NVIDIA Corporation's two reportable segments, GPU and Tegra Processor, are based on a single underlying graphics architecture. *See id.* NVIDIA's GPU and Tegra SoC platforms serve many markets, from consumer PC gaming to enterprise workstations to government and cloud service provider datacenters. *See id.*, p. 9.



Source: 2018 NVIDIA Corporation Form 10-K, p. 5.

62. NVIDIA does not directly manufacture semiconductor wafers used for its products. Instead, NVIDIA utilizes a “fabless” manufacturing strategy, whereby NVIDIA employs third party suppliers for wafer fabrication, assembly, testing, and packaging. *See* 2018 NVIDIA Form 10-K, p. 9. This allows NVIDIA to “focus [its] resources on product design, additional quality assurance, marketing, and customer support.” *Id.* On information and belief, the bulk of NVIDIA’s semiconductor wafers are fabricated by Taiwan Semiconductor Manufacturing Company Limited (“TSMC”).

63. For fiscal years 2013 through 2018, NVIDIA Corporation reported global revenues of more than \$34 billion. On information and belief, a substantial portion of this revenue is attributable to infringing sales made in the United States, including, without limitation: (a) NVIDIA products sold directly to consumers and companies in the United States; (b) NVIDIA products sold abroad and with knowledge that those products would be incorporated in finished products and then imported into the United States for sale and/or use; and (c)

NVIDIA products nominally sold abroad but for which substantial activities underlying the sales transactions (e.g., design-win activities, negotiations, testing, qualification) take place in the United States.

64. NVIDIA Corporation acknowledges that for products not sold directly to consumers, “achieving design wins is an important success factor.” 2018 NVIDIA Corporation Form 10-K, p. 14. “Achieving design wins may involve a lengthy process in pursuit of a customer opportunity and depend on our ability to anticipate features and functionality that customers and consumers will demand.” *Id.* To that end, NVIDIA Corporation has deemed it critical to employ sales teams with “a high level of technical expertise and product and industry knowledge to support the competitive and complex design win process,” along with a “highly skilled team of application engineers to assist our Channel in designing, testing, and qualifying system designs that incorporate our products.” 2016 NVIDIA Corporation Form 10-K, p. 7. On information and belief, the sales teams and application engineers referenced in NVIDIA Corporation’s Form 10-K filing are located primarily in the United States.

65. NVIDIA Corporation also works in collaboration with industry leaders to develop products: “We invest significant resources in the development of relationships with industry leaders, often assisting these companies in the product definition of their new products. We believe that forming these relationships and utilizing next-generation development tools to design, simulate and verify our products will help us remain at the forefront of visual computing and develop products that utilize leading-edge technology on a rapid basis.” 2017 NVIDIA Corporation Form 10-K, p. 10.

66. NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United

States, and provides support for 40nm Fermi GPUs, including products with the part name or number GF100, GF104, GF106, GF108, GF110, GF114, GF116, GF117, GF118, and GF119 (the “40nm Fermi GPUs”). On information and belief, NVIDIA 40nm Fermi GPUs are made using TSMC’s 40nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 40nm Fermi GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

C2070 GPU Computing Module	GeForce GT 620	GeForce GTX 675M
C2075 GPU Computing Module	GeForce GT 620M	GeForce GTX465
GeForce 410M	GeForce GT 625	GeForce GTX470
GeForce 510	GeForce GT 625M	GeForce GTX480
GeForce 605	GeForce GT 630	GeForce GTX480M
GeForce 610M	GeForce GT 630M	M2050 GPU Module
GeForce 710M	GeForce GT 635M	M2070 GPU Computing Module
GeForce 720M	GeForce GT 640	M2090 GPU Computing Module
GeForce 810M	GeForce GT 640M LE	Quadro 1000M
GeForce 820M	GeForce GT 645	Quadro 2000
GeForce GT 415M	GeForce GT 705	Quadro 3000M
GeForce GT 420	GeForce GT 730	Quadro 4000
GeForce GT 420M	GeForce GTS 450	Quadro 4000M
GeForce GT 425M	GeForce GTX 460	Quadro 5000
GeForce GT 430	GeForce GTX 460 SE	Quadro 5000M
GeForce GT 435M	GeForce GTX 460M	Quadro 500M
GeForce GT 440	GeForce GTX 470M	Quadro 5010M
GeForce GT 445M	GeForce GTX 485M	Quadro 600
GeForce GT 520	GeForce GTX 550 Ti	Quadro 6000
GeForce GT 520M	GeForce GTX 555	Quadro 7000
GeForce GT 520MX	GeForce GTX 560	Quadro NVS 315
GeForce GT 525M	GeForce GTX 560 SE	Quadro Plex 7000
GeForce GT 530	GeForce GTX 560 Ti	S2050 GPU Computing Server
GeForce GT 540M	GeForce GTX 560M	S2070 GPU Computing Server
GeForce GT 545	GeForce GTX 570	
GeForce GT 550M	GeForce GTX 570M	
GeForce GT 555M	GeForce GTX 580	
GeForce GT 610	GeForce GTX 580M	
	GeForce GTX 590	
	GeForce GTX 670M	

67. NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 28nm Kepler GPUs, including products with the part name or number GK104, GK106, GK107, GK110, and GK208 (the “28nm Kepler GPUs”). On information and belief, NVIDIA 28nm Kepler GPUs are made using TSMC’s 28nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 28nm Kepler GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

GeForce 825M	GeForce GTX 650 Ti	GeForce GTX 680M
GeForce 920M	Boost	GeForce GTX 680MX
GeForce GT 630	GeForce GTX 660	GRID K1
GeForce GT 635	GeForce GTX 660 Ti	GRID K2
GeForce GT 640	GeForce GTX 670	GRID K340
GeForce GT 640M	GeForce GTX 680	GRID K520
GeForce GT 640M LE	GeForce GTX 690	K10 GPU Accelerator
GeForce GT 645M	GeForce GTX 760	K20 GPU Accelerator
GeForce GT 650M	GeForce GTX 760 Ti	K20X GPU Accelerator
GeForce GT 660M	GeForce GTX 760M	K40 GPU Accelerator
GeForce GT 710	GeForce GTX 765M	Quadro 410
GeForce GT 720	GeForce GTX 770	Quadro K1000M
GeForce GT 720M	GeForce GTX 770M	Quadro K1100M
GeForce GT 730	GeForce GTX 780	Quadro K2000
GeForce GT 730M	GeForce GTX 780 Ti	Quadro K2000D
GeForce GT 735M	GeForce GTX 780M	Quadro K2000M
GeForce GT 740	GeForce GTX 860M	Quadro K2100M
GeForce GT 740M	GeForce GTX 870M	Quadro K3000M
GeForce GT 745M	GeForce GTX 880M	Quadro K3100M
GeForce GT 750M	GeForce GTX TITAN	Quadro K4000
GeForce GT 755M	GeForce GTX TITAN	Quadro K4000M
GeForce GTX 645	Black	Quadro K4100M
GeForce GTX 650	GeForce GTX TITAN Z	Quadro K420
GeForce GTX 650 Ti	GeForce GTX 670MX	Quadro K4200
	GeForce GTX 675MX	Quadro K5000

Quadro K5000M
 Quadro K500M
 Quadro K5100M

Quadro K510M
 Quadro K5200
 Quadro K600

Quadro K6000
 Quadro K610M
 Quadro NVS 510

68. NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 28nm Maxwell GPUs, including products with the part name or number GM107, GM108, GM200, GM204, and GM206 (the “28nm Maxwell GPUs”). On information and belief, NVIDIA 28nm Maxwell GPUs are made using TSMC’s 28nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 28nm Maxwell GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

GeForce 840M
 GeForce 845M
 GeForce 930M
 GeForce 940M
 GeForce GT 945A
 GeForce GTX 745
 GeForce GTX 750
 GeForce GTX 750 Ti
 GeForce GTX 850M
 GeForce GTX 860M
 GeForce GTX 950
 GeForce GTX 950M
 GeForce GTX 960
 GeForce GTX 960M
 GeForce GTX 965M

GeForce GTX 970
 GeForce GTX 970M
 GeForce GTX 980
 GeForce GTX 980 Ti
 GeForce GTX 980
 GeForce GTX 980M
 GeForce GTX TITAN X
 GeForce MX110
 GeForce MX130
 M10 GPU Accelerator
 M4 GPU Accelerator
 M40 GPU Accelerator
 Quadro K1200
 Quadro K2200
 Quadro K2200M

Quadro K620
 Quadro M1000M
 Quadro M1200
 Quadro M2000
 Quadro M2000M
 Quadro M2200
 Quadro M500M
 Quadro M520
 Quadro M6000
 Quadro M600M
 Quadro M620
 Quadro NVS 810
 Jetson Nano

69. NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United

States, and provides support for 16nm Pascal GPUs, including products with the part name or number GP100, GP102, GP104, and GP106 (the “16nm Pascal GPUs”). On information and belief, NVIDIA 16nm Pascal GPUs are made using TSMC’s 16nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 16nm Pascal GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

GeForce GTX 1060	GeForce GTX 1080 Ti	Quadro P4000
GeForce GTX 1060 Max-Q	NVIDIA TITAN X	Quadro P4000 Max-Q
GeForce GTX 1070	NVIDIA TITAN Xp	Quadro P4200
GeForce GTX 1070 Max-Q	P100 GPU Accelerator	Quadro P5000
GeForce GTX 1070 Ti	P4 GPU Accelerator	Quadro P5200
GeForce GTX 1080	P40 GPU Accelerator	Quadro P6000
GeForce GTX 1080 Max-Q	P6 GPU Accelerator	Jetson TX2
	Quadro GP100	
	Quadro P3000	
	Quadro P3200	

70. NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 28nm Tegra K1 SoCs, including products with the part name or number T124 and T132 (the “28nm Tegra K1 SoCs”). The 28nm Tegra K1 SoCs feature, among other things, a 28nm Kepler GPU. On information and belief, NVIDIA 28nm Tegra K1 SoCs are made using TSMC’s 28nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 28nm Tegra K1 SoCs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported

into the United States, including, for example, the NVIDIA SHIELD Tablet, Acer Chromebook 13, Google Nexus 9, Lenovo ThinkVision 28, and Google Project Tango Tablet.

71. NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 20nm Tegra X1 SoCs, including products with the part name or number T210 and NX (the “20nm Tegra X1 SoCs”). The 20nm Tegra X1 SoCs feature, among other things, a 20nm Maxwell GPU. On information and belief, NVIDIA 20nm Tegra X1 SoCs are made using TSMC’s 20nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 20nm Tegra X1 SoCs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, the NVIDIA SHIELD TV, NVIDIA SHIELD Tablet, NVIDIA DRIVE CX & PX, Google Pixel C, and Nintendo Switch.

72. NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for the Tesla GPUs, including products with the part name or number Tesla P100 and Tesla V100 that are made using TSMC’s Chip-on-Wafer-on-Substrate (“CoWoS”) technology (the “CoWoS GPUs”). On information and belief, NVIDIA CoWoS GPUs include the same or similar structures and features. On information and belief, NVIDIA CoWoS GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, the NVIDIA DGX-1 and DGX-2 supercomputers and data center products provided by Acer, ASUSTek Computer, Cisco, Dell, Fujitsu, Google, Lenovo, Penguin Computing, and Supermicro, among others. *See, e.g.,* <https://www.nvidia.com/en-us/data-center/where-to-buy-tesla/>.

CLAIMS FOR PATENT INFRINGEMENT

73. Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through 72 as though fully set forth herein.

74. The allegations provided below are exemplary and without prejudice to Plaintiffs' infringement contentions provided pursuant to the Court's scheduling order and local rules. In providing these allegations, Plaintiffs do not convey or imply any particular claim constructions or the precise scope of the claims. Plaintiffs' claim construction contentions regarding the meaning and scope of the claim terms will be provided under the Court's scheduling order and local rules.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 6,232,231

75. Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through 74 as though fully set forth herein.

76. On May 15, 2001, the United States Patent and Trademark Office ("USPTO") duly and legally issued the '231 patent, titled "Planarized Semiconductor Interconnect Topography and Method For Polishing a Metal Layer To Form Interconnect," naming Anantha R. Sethuraman and Christopher A. Seams as inventors. A true and correct copy of the '231 patent is attached hereto as Exhibit A.

77. Invensas owns the entire right, title, and interest in and to the '231 patent, including the right to sue and recover damages, including damages for past infringement.

78. Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

79. By at least December 2, 2014, Plaintiffs disclosed the existence of the '231 patent to NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International and explained, in the

form of claim charts, how certain exemplary NVIDIA devices infringe one or more claims of the '231 patent. Thus, since at least December 2, 2014, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have had knowledge of the '231 patent and that their activities infringe the '231 patent. In addition, since at least December 2, 2014, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known that their customers, distributors, and other purchasers of the '231 Accused Products were infringing the '231 patent.

80. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have infringed, directly and/or indirectly, either literally or under the doctrine of equivalents, at least claim 1 of the '231 patent in violation of at least 35 U.S.C. § 271(b) and/or (g) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '231 patent.

81. Based on the information presently available, Plaintiffs allege that NVIDIA's 40nm Fermi GPUs, 28nm Kepler GPUs, 28nm Maxwell GPUs, 16nm Pascal GPUs, 28nm Tegra K1 SoCs, and 20nm Tegra X1 SoCs are exemplary devices that infringe at least claim 1 of the '231 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'231 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to supplement and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

82. On information and belief, the '231 Accused Products meet each and every limitation of at least claim 1 of the '231 patent.

83. Claim 1 of the '231 patent recites a “method for providing a substantially planar semiconductor topography which extends above a plurality of electrically conductive features that form an integrated circuit[.]” On information and belief, the '231 Accused Products comprise a substantially planar semiconductor topography that extends above a plurality of electrically conductive features that form an integrated circuit. For example, the '231 Accused Products comprise a substantially planar layer extending over a layer below that contains a plurality of electrically conductive features that form an integrated circuit.

84. Claim 1 of the '231 patent requires “etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches[.]” On information and belief, the '231 Accused Products comprise semiconductor chips that are made by a process that includes etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches. For example, the '231 Accused Products comprise multiple dummy trenches laterally spaced between a first interconnect and a series of second interconnects, each of which was formed in part by etching trenches into a layer of insulating material.

85. Claim 1 of the '231 patent further requires that “a lateral dimension of said first trench is greater than a lateral dimension of said second trenches[.]” On information and belief, the lateral dimension of a first trench is greater than a lateral dimension of a series of second trenches (i.e., the first trench is wider than at least one of the second trenches) in the '231 Accused Products. For example, the width of the first trench is greater than the width of one or more of the second trenches.

86. Claim 1 of the '231 patent further requires “filling said dummy trenches and said first and second trenches with a conductive material[.]” On information and belief, in the '231

Accused Products, the first, second, and dummy trenches are filled with a conductive material. For example, the first interconnect, second interconnects, and dummy connectors are formed from copper that was filled into trenches etched into the insulating layer.

87. Claim 1 of the '231 patent further requires “polishing said conductive material to form dummy conductors exclusively in said dummy trenches and interconnect exclusively in said first and second trenches[.]” On information and belief, in the '231 Accused Products, the interconnects and dummy conductors are made by a process that includes polishing the conductive material deposited in the first, second, and dummy trenches until the conductive material is exclusively in those trenches (i.e., the conductive material in the first, second, and dummy trenches has been polished such that the copper in the dummy trenches does not connect to the copper in either of the first or second trenches). For example, copper deposited in the dummy trenches has been polished so that it is separate from the copper deposited in the first and second trenches.

88. Claim 1 of the '231 patent further requires “said dummy conductors are electrically separate from said plurality of electrically conductive features and co-planar with said interconnect.” On information and belief, in the '231 Accused Products, the dummy conductors are co-planar with the interconnect and electrically separate from the plurality of electrically conductive features. For example, the upper surfaces of the interconnects are coplanar with the upper surfaces of the dummy conductors, and the dummy conductors are electrically separate from the active or passive electrical components below the dummy conductors.

89. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have imported into the United States, or offered to sell, sell, or used within the United States, the '231

Accused Products, knowing that such products are made by a process covered by at least claim 1 of the '231 patent, in violation of 35 U.S.C. § 271(g). For example, on information and belief, NVIDIA Singapore has sold '231 Accused Products and shipped them to the United States. As another example, on information and belief, [REDACTED] [REDACTED]. As another example, NVIDIA Corporation, NVIDIA Singapore, and/or NVIDIA International have offered to sell the '231 Accused Products in the United States through NVIDIA's online store, <https://web.archive.org/web/20150506105821/http://www.geforce.com/hardware> (archived: May 6, 2015), and, on information and belief, through domestic retailers such as Best Buy. The infringing semiconductor chips of the '231 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

90. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 1 of the '231 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International, knowing their products infringe the '231 patent and with the specific intent for others to infringe the '231 patent, have actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers ("AIBs"), automotive suppliers, and retailers/distributors, to sell, offer for sale, use, and/or import into the United States, without license or authority, '231 Accused Products and/or products containing '231 Accused Products made by a process patented in the United States. For example, NVIDIA published and provided marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instructed

and encouraged third parties to integrate the '231 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encouraged NVIDIA's customers to purchase and use those products in the United States. *E.g.*,

[https://web.archive.org/web/20150506104826/http://www.geforce.com/hardware/](https://web.archive.org/web/20150506104826/http://www.geforce.com/hardware/compare-buy-gpus)

[compare-buy-gpus](https://web.archive.org/web/20150821070328/http://www.nvidia.com/object/tegra.html) (archived: May 6, 2015); [https://web.archive.org/web/20150821070328/](https://web.archive.org/web/20150821070328/http://www.nvidia.com/object/tegra.html)

<http://www.nvidia.com/object/tegra.html> (archived: August 21, 2015). NVIDIA has also

established the "NVIDIA Partner Network" to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, [https://web.archive.org/web/20150819100649/](https://web.archive.org/web/20150819100649/http://www.nvidia.com/object/nvidia-partner-network.html)

<http://www.nvidia.com/object/nvidia-partner-network.html> (archived: August 19, 2015).

Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs in the United States, or import them into the United States. These activities were designed to bring NVIDIA's infringing products to market in the United States.

91. Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '231 patent, including, without limitation, not less than a reasonable royalty.

92. NVIDIA's infringement of the '231 patent has been willful and deliberate, entitling Plaintiffs to enhanced damages and attorneys' fees.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 6,849,946

93. Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through 92 as though fully set forth herein.

94. On February 1, 2005, the USPTO duly and legally issued the '946 patent, titled "Planarized Semiconductor Interconnect Topography and Method For Polishing a Metal Layer To Form Interconnect," naming Anantha R. Sethuraman and Christopher A. Seams as inventors. A true and correct copy of the '946 patent is attached hereto as Exhibit B.

95. Invensas owns the entire right, title, and interest in and to the '946 patent, including the right to sue and recover damages, including damages for past infringement.

96. Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

97. By at least December 2, 2014, Plaintiffs disclosed the existence of the '946 patent to NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International and explained, in the form of claim charts, how certain exemplary NVIDIA devices infringe one or more claims of the '946 patent. Thus, since at least December 2, 2014, NVIDIA Corporation, NVIDIA Singapore, and/or NVIDIA International have had knowledge of the '946 patent and that their activities infringe the '946 patent. In addition, since at least December 2, 2014, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known that their customers, distributors, and other purchasers of the '946 Accused Products were infringing the '946 patent.

98. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have infringed, directly and/or indirectly, either literally or under the doctrine of equivalents, at least claim 16 of the '946 patent in violation of at least 35 U.S.C. § 271(a) and/or (b) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '946 patent.

99. Based on the information presently available to it, Plaintiffs allege that NVIDIA's 40nm Fermi GPUs, 28nm Kepler GPUs, 28nm Maxwell GPUs, 16nm Pascal GPUs, 28nm Tegra K1 SoCs, and 20nm Tegra X1 SoCs are exemplary devices that infringe at least claim 16 of the '946 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'946 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to augment, supplement, and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

100. Claim 16 of the '946 patent recites "[a] substantially planar semiconductor topography[.]" On information and belief, the '946 Accused Products comprise a substantially planar semiconductor topography. For example, the upper surfaces of the first trench, plurality of laterally spaced dummy trenches, series of second trenches, and the dielectric layer are substantially planar.

101. Claim 16 of the '946 patent requires "a plurality of laterally spaced dummy trenches in a dielectric layer, between a first trench and a series of second trenches[.]" On information and belief, the '946 Accused Products comprise a plurality of laterally spaced dummy trenches in a dielectric layer between a first trench and a series of second trenches. For example, there are multiple laterally spaced dummy trenches in insulating material that are between a first relatively wide trench and a series of second relatively narrow trenches.

102. Claim 16 of the '946 patent further requires that "each of the second trenches is relatively narrow compared to the first trench" and "a lateral dimension of at least one of the laterally spaced dummy trenches is less than a lateral dimension of the first trench and greater

than a lateral dimension of at least one of the series of second trenches[.]” On information and belief, the second trenches in the ’946 Accused Products are relatively narrow compared to the first trench (i.e., each of the relatively narrow trenches is narrower than the relatively wide trench), and a lateral dimension of at least one of the laterally spaced dummy trenches is less than a lateral dimension of the first trench and greater than a lateral dimension of at least one of the series of second trenches. For example, the width of one or more of the dummy trenches is less than the width of the relatively wide trench, and greater than the width of one or more of the relatively narrow trenches.

103. Claim 16 of the ’946 patent further requires “dummy conductors in said laterally spaced dummy trenches and electrically separate from electrically conductive features below said dummy conductors[.]” On information and belief, in the ’946 Accused Products, dummy conductors in the laterally spaced dummy trenches are electrically separate from electrically conductive features below the dummy conductors. For example, the copper-based dummy conductors in the dummy trenches are electrically separate from the copper-based conductive lines in the first trench and the series of second trenches, and from active or passive electrical components below the dummy conductors.

104. Claim 16 of the ’946 patent further requires “conductive lines in said series of second trenches and said first trench, wherein upper surfaces of said conductive lines are substantially coplanar with dummy conductor upper surfaces.” On information and belief, the upper surfaces of the conductive lines in the ’946 Accused Products are substantially coplanar with the dummy conductor upper surfaces. For example, the upper surfaces of the copper-based interconnects are substantially coplanar with the upper surfaces of the dummy conductors.

105. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 16 of the '946 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International, knowing their products infringe the '946 patent and with the specific intent for others to infringe the '946 patent, have actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers ("AIBs"), and retailers/distributors, to sell, offer for sale, use, and/or import into the United States, without license or authority, '946 Accused Products and/or products containing '946 Accused Products. For example, NVIDIA published and provided marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instructed and encouraged third parties to integrate the '946 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encouraged NVIDIA's customers to purchase and use those products in the United States. *E.g.*, <https://web.archive.org/web/20150506104826/http://www.geforce.com/hardware/compare-buy-gpus> (archived: May 6, 2015); <https://web.archive.org/web/20150821070328/http://www.nvidia.com/object/tegra.html> (archived: August 21, 2015). NVIDIA has also established the "NVIDIA Partner Network" to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, <https://web.archive.org/web/20150819100649/http://www.nvidia.com/object/nvidia-partner-network.html> (archived: August 19, 2015). Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs

in the United States, or import them into the United States. These activities were designed to bring NVIDIA's infringing products to market in the United States.

106. Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '946 patent, including, without limitation, not less than a reasonable royalty.

107. NVIDIA's infringement of the '946 patent has been willful and deliberate, entitling Plaintiffs to enhanced damages and attorneys' fees.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 7,064,005

108. Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through 107 as though fully set forth herein.

109. On June 20, 2006, the USPTO duly and legally issued the '005 patent, titled "Semiconductor Apparatus and Method of Manufacturing Same," naming Yuji Takaoka as the inventor. A true and correct copy of the '005 patent is attached hereto as Exhibit C.

110. Tessera Advanced Technologies, Inc. owns the entire right, title, and interest in and to the '005 patent, including the right to sue and recover damages, including damages for past infringement.

111. Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

112. Since at least the filing of this Complaint, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have had knowledge of the '005 patent and that their activities infringe the '005 patent. In addition, since at least the filing of this Complaint, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known

that their customers, distributors, and other purchasers of the '005 Accused Products are infringing the '005 patent.

113. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have infringed, either literally or under the doctrine of equivalents, at least claim 1 of the '005 patent in violation of at least 35 U.S.C. § 271(b) and/or (g) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '005 patent.

114. Based on the information presently available to it, Plaintiffs allege that NVIDIA's CoWoS GPUs, including the Tesla P100 and Tesla V100, are exemplary devices that infringe at least claim 1 of the '005 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'005 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to augment, supplement, and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

115. Claim 1 of the '005 patent recites a "method of manufacturing a semiconductor apparatus constituting a multichip module wherein a plurality of device chips are flip-chip mounted on an interposer substrate[.]" On information and belief, the '005 Accused Products comprise a semiconductor apparatus constituting a multichip module wherein a plurality of device chips are flip-chip mounted on an interposer substrate. For example, the '005 Accused Products comprise a passive silicon interposer with a GP100 chip and four memory stacks, each including a base die, flip-chip mounted on the interposer.

116. Claim 1 of the '005 patent requires “a first step for forming an embedded electrode by filling a contact hall penetrating through a wafer with conductor, said wafer being a base material of said interposer substrate[.]” On information and belief, the '005 Accused Products comprise an embedded electrode that was formed by filling a contact hall penetrating through a wafer with conductor, said wafer being a base material of said interposer substrate. For example, the '005 Accused Products comprise a passive silicon interposer that includes embedded electrodes passing through it. The passive silicon interposer was created from a wafer of silicon, the base material of the interposer substrate.

117. Claim 1 of the '005 patent further requires “a second step for forming wiring including a connection electrode connected to a first end of the embedded electrode and a connection electrode on which said device chips to be flip-chip mounted on a surface of said wafer[.]” On information and belief, the '005 Accused Products comprise wiring including a connection electrode connected to a first end of the embedded electrode and a connection electrode on which said device chips to be flip-chip mounted on a surface of said wafer. For example, the '005 Accused Products comprise a passive silicon interposer that has wiring including a connection electrode on its upper surface (in the finished part) connected to an embedded electrode. The device chips are flip-chip mounted on the connection electrode.

118. Claim 1 of the '005 patent further requires “a third step for forming said interposer substrate by grinding and polishing a back surface of said wafer until a second end of said embedded electrode is exposed after said plurality of device chips are flip-chip mounted on said connection electrode formed in the second step[.]” On information and belief, the '005 Accused Products comprise an interposer substrate formed by grinding and polishing a back surface of said wafer until a second end of said embedded electrode is exposed after said

plurality of device chips are flip-chip mounted on said connection electrode formed in the second step. For example, the '005 Accused Products comprise a passive silicon interposer that has been formed by grinding and polishing the lower surface (in the finished part) in order to expose the second end of the embedded electrode.

119. Claim 1 of the '005 patent further requires “a fourth step for providing a bump electrode on the second end of said embedded electrode exposed in the third step[.]” On information and belief, the '005 Accused Products comprise a bump electrode provided on the second end of said embedded electrode exposed by grinding and polishing. For example, the '005 Accused Products comprise a bump electrode on the end of the embedded electrode exposed on the lower surface (in the finished part) of the passive silicon interposer.

120. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have imported into the United States, or offered to sell, sell, or used within the United States, the '005 Accused Products, knowing that such products are made by a process covered by at least claim 1 of the '005 patent, in violation of 35 U.S.C. § 271(g). For example, on information and belief, NVIDIA Singapore has sold '005 Accused Products and shipped them to the United States. As another example, on information and belief, [REDACTED] [REDACTED]. As another example, NVIDIA Corporation, NVIDIA Singapore, and/or NVIDIA International have offered to sell the '005 Accused Products in the United States through NVIDIA's website, <https://www.nvidia.com/en-us/data-center/dgx-1> (“Order NVIDIA DGX Today”). The infringing semiconductor chips of the '005 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

121. Since at least the filing of this Complaint, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 1 of the '005 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International, knowing their products infringe the '005 patent and with the specific intent for others to infringe the '005 patent, have actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers ("AIBs"), automotive suppliers, and retailers/distributors, to sell, offer for sale, use, and/or import into the United States, without license or authority, '005 Accused Products and/or products containing '005 Accused Products made by a process patented in the United States. For example, NVIDIA publishes and provides marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instruct and encourage third parties to integrate the '005 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encourage NVIDIA's customers to purchase and use those products in the United States. *E.g.*, <https://www.nvidia.com/en-us/data-center/tesla-p100/>; <https://www.nvidia.com/en-us/data-center/tesla-v100/>. NVIDIA has also established the "NVIDIA Partner Network" to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, <https://www.nvidia.com/en-us/about-nvidia/partners/>. Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs in the United States, or import them

into the United States. These activities are designed to bring NVIDIA's infringing products to market in the United States.

122. Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '005 patent, including, without limitation, not less than a reasonable royalty.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 6,317,333

123. Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through 122 as though fully set forth herein.

124. On November 13, 2001, the USPTO duly and legally issued the '333 patent, titled "Package Construction of Semiconductor Device," naming Shinji Baba as the inventor. A true and correct copy of the '333 patent is attached hereto as Exhibit D.

125. Tessera Advanced Technologies, Inc. owns the entire right, title, and interest in and to the '333 patent, including the right to sue and recover damages, including damages for past infringement.

126. Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

127. By at least October 13, 2014, Plaintiffs disclosed the existence of the '333 patent to NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International and explained, in the form of claim charts, how certain exemplary NVIDIA devices infringe one or more claims of the '333 patent. Thus, since at least October 13, 2014, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have had knowledge of the '333 patent and that their activities infringe the '333 patent. In addition, since at least October 13, 2014, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known that their

customers, distributors, and other purchasers of the '333 Accused Products were infringing the '333 patent.

128. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have infringed, directly and/or indirectly, either literally or under the doctrine of equivalents, at least claim 1 of the '333 patent in violation of at least 35 U.S.C. § 271(a) and/or (b) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '333 patent.

129. Based on the information presently available to it, Plaintiffs allege that NVIDIA's Tesla K10 Server Accelerator Card and Grid K2 Graphics Card, and MSI's GeForce GTX 750 Ti Graphics Card devices, are exemplary devices that infringe at least claim 1 of the '333 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'333 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to augment, supplement, and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

130. Claim 1 of the '333 patent requires "a ball grid array (BGA) substrate including an upper insulating layer comprising a plurality of laminated layers, an intermediate insulating layer, and a lower insulating layer comprising a plurality of laminated insulating layers[.]" On information and belief, the '333 Accused Products comprise a BGA substrate including an upper insulating layer comprising a plurality of laminated layers, an intermediate insulating layer, and a lower insulating layer comprising a plurality of laminated insulating layers. For example, the '333 Accused Products comprise a GPU semiconductor device in a BGA substrate package,

wherein the BGA substrate includes an insulating core layer and upper and lower insulating layers, wherein each of the upper and lower insulating layers includes multiple laminated layers.

131. Claim 1 of the '333 patent further requires "a plurality of lines on top surfaces of the insulating layers included in each of the upper, intermediate, and lower layers, respectively[.]" On information and belief, the '333 Accused Products comprise a plurality of lines on top surfaces of the insulating layers included in each of the upper, intermediate, and lower layers, respectively. For example, the '333 Accused Products comprise multiple interconnect traces located on the top surfaces of each of the upper insulating layer, intermediate core layer, and lower insulating layer.

132. Claim 1 of the '333 patent further requires "a plurality of solder balls disposed on an outermost surface of the lower insulating layer[.]" On information and belief, the '333 Accused Products comprise a plurality of solder balls disposed on an outermost surface of the lower insulating layer. For example, the '333 Accused Products comprise BGA solder balls arranged on a bottom surface of the lower insulating layer, which are used for soldering when mounting the package to a circuit board.

133. Claim 1 of the '333 patent further requires "a semiconductor chip having a plurality of electrodes connected to respective lines, the semiconductor chip being connected electrically to the plurality of solder balls through a plurality of via holes in each of the upper, lower, and intermediate insulating layers[.]" On information and belief, the '333 Accused Products comprise a semiconductor chip having a plurality of electrodes connected to respective lines, the semiconductor chip being connected electrically to the plurality of solder balls through a plurality of via holes in each of the upper, lower, and intermediate insulating layers. For example, the '333 Accused Products comprise a GPU semiconductor chip having a plurality of

flip-chip solder bumps connected to interconnect traces, the semiconductor chip being electrically connected to the BGA solder balls through vias formed in each of the upper insulating layer, intermediate core layer, and lower insulating layer.

134. Claim 1 of the '333 patent further recites that “the intermediate insulating layer is a material having thermal expansion characteristics substantially matching thermal expansion characteristics of a circuit board, the semiconductor device being mounted on the circuit board, and the upper and lower insulating layers have thermal expansion characteristics different from but similar to that of the intermediate insulating layer so that interlayer peeling of the BGA substrate is prevented[.]” On information and belief, the '333 Accused Products comprise an intermediate insulating layer that is a material having thermal expansion characteristics substantially matching thermal expansion characteristics of a circuit board, the semiconductor device being mounted on the circuit board, and the upper and lower insulating layers having thermal expansion characteristics different from but similar to that of the intermediate insulating layer so that interlayer peeling of the BGA substrate is prevented. For example, the coefficient of thermal expansion (“CTE”) of the intermediate core layer substantially matches the CTE of the circuit board to which the semiconductor device is mounted, and the CTEs of the upper and lower build-up layers is different from but similar to the CTE of the intermediate core layer, which prevents interlayer peeling of the substrate.

135. NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 1 of the '333 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International, knowing their products infringe the '333 patent and with the specific intent for others to infringe the '333 patent, have actively encouraged third parties,

including OEMs, ODMs, system builders, add-in board manufacturers (“AIBs”), and retailers/distributors, to make, have made, use, sell, offer for sale, and/or import into the United States, without license or authority, ’333 Accused Products and/or products containing ’333 Accused Products. For example, NVIDIA published and provided marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instructed and encouraged third parties to integrate the ’333 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encouraged NVIDIA’s customers to purchase and use those products in the United States. *E.g.*, <http://web.archive.org/web/20150910180943/http://www.nvidia.com/object/grid-enterprise-resources.html#datasheets> (archived: Sept. 10, 2015); <http://web.archive.org/web/20150907121006/http://www.nvidia.com/object/tesla-supercomputing-solutions.html> (archived: Sept. 7, 2015). NVIDIA has also established the “NVIDIA Partner Network” to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, <https://web.archive.org/web/20150819100649/http://www.nvidia.com/object/nvidia-partner-network.html> (archived: August 19, 2015). Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs in the United States, or import them into the United States. These activities were designed to bring NVIDIA’s infringing products to market in the United States.

136. Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '333 patent, including, without limitation, not less than a reasonable royalty.

137. NVIDIA's infringement of the '333 patent has been willful and deliberate, entitling Plaintiffs to enhanced damages and attorneys' fees.

JURY DEMAND

138. Plaintiffs demand a jury trial as to all issues that are triable by a jury in this action.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs respectfully pray for relief as follows:

- (a) Judgment that NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International are liable for infringement and/or inducing infringement of one or more claims of the Asserted Patents;
- (b) Compensatory damages in an amount according to proof, and in any event no less than a reasonable royalty;
- (c) Treble damages for willful infringement pursuant to 35 U.S.C. § 284;
- (d) Pre-judgment interest;
- (e) Post-judgment interest;
- (f) Attorneys' fees based on this being an exceptional case pursuant to 35 U.S.C. § 285, including pre-judgment interest on such fees;
- (g) An accounting and/or supplemental damages for all damages occurring after any discovery cutoff and through final judgment;
- (h) Costs and expenses; and
- (i) Any and all other relief that the Court deems just and proper.

Dated: _____, 2020

Respectfully submitted,

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EXHIBIT A



(12) **United States Patent**
Sethuraman et al.

(10) **Patent No.:** **US 6,232,231 B1**
(45) **Date of Patent:** **May 15, 2001**

(54) **PLANARIZED SEMICONDUCTOR
INTERCONNECT TOPOGRAPHY AND
METHOD FOR POLISHING A METAL
LAYER TO FORM INTERCONNECT**

(75) Inventors: **Anantha R. Sethuraman**, Fremont;
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both of CA (US)

(73) Assignee: **Cypress Semiconductor Corporation**,
San Jose, CA (US)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/143,723**
(22) Filed: **Aug. 31, 1998**

(51) **Int. Cl.**⁷ **H01L 21/302**; H01L 21/461
(52) **U.S. Cl.** **438/691**; 438/692; 438/697;
438/700
(58) **Field of Search** 438/691, 692,
438/697, 700; 216/38, 88, 89; 156/636.1,
639.1, 645.1; 204/192.37, 192.35

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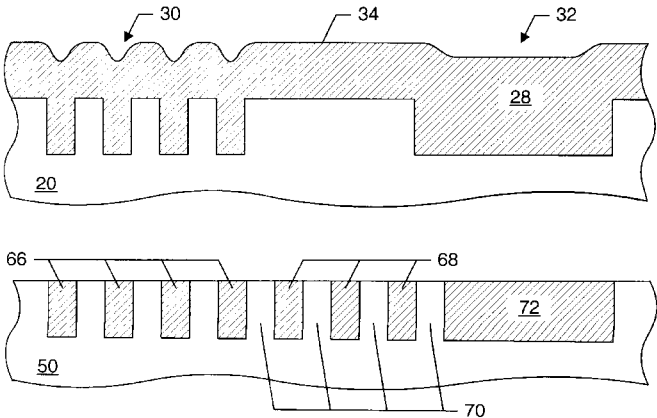
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Primary Examiner—Charles Bowers
Assistant Examiner—Hsien-Ming Lee
(74) *Attorney, Agent, or Firm*—Kevin L. Daffer; Conley,
Rose & Tayon

(57) **ABSTRACT**

The present invention advantageously provides a substantially planarized semiconductor topography and method for making the same by forming a plurality of dummy features in a dielectric layer between a relatively wide interconnect and a series of relatively narrow interconnect. According to an embodiment, a plurality of laterally spaced dummy trenches are first etched in the dielectric layer between a relatively wide trench and a series of relatively narrow trenches. The dummy trenches, the wide trench, and the narrow trenches are filled with a conductive material, e.g., a metal. The conductive material is deposited to a level spaced above the upper surface of the dielectric layer. The surface of the conductive material is then polished to a level substantially coplanar with that of the upper surface of the dielectric layer. Advantageously, the polish rate of the conductive material above the dummy trenches and the wide and narrow trenches is substantially uniform. In this manner, dummy conductors spaced apart by dielectric protrusions are formed exclusively in the dummy trenches, and interconnect are formed exclusively in the narrow and wide trenches. The topological surface of the resulting interconnect level is substantially void of surface disparity.

16 Claims, 3 Drawing Sheets



US 6,232,231 B1

Page 2

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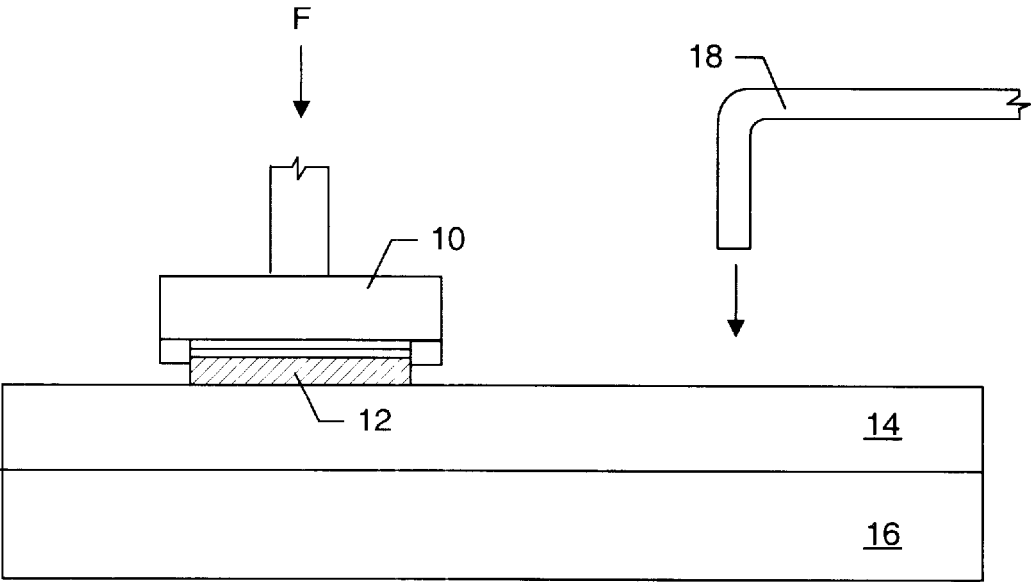


FIG. 1

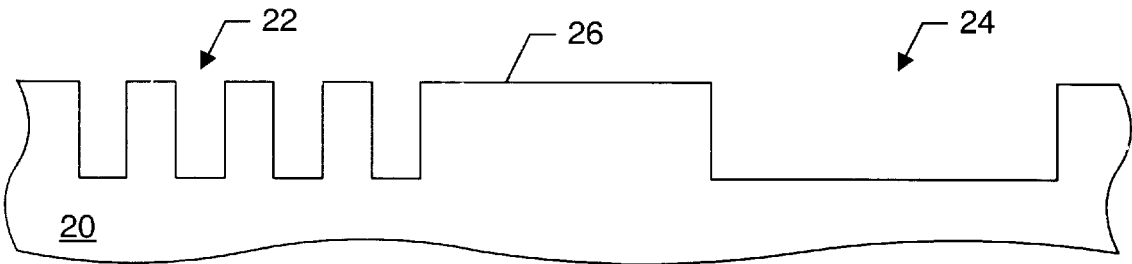


FIG. 2

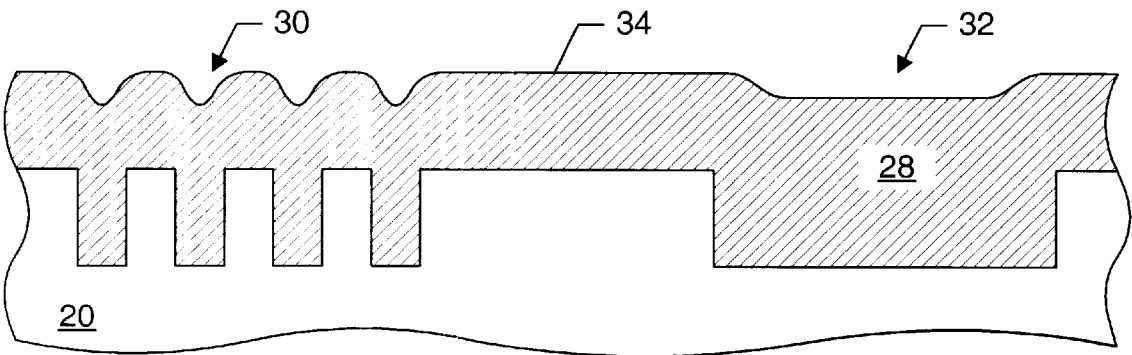


FIG. 3

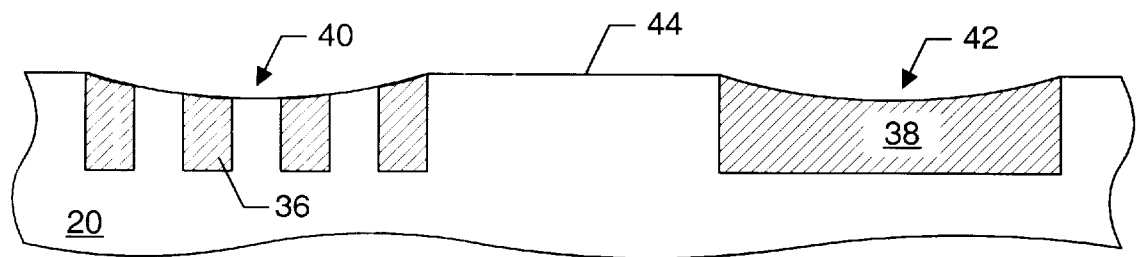


FIG. 4

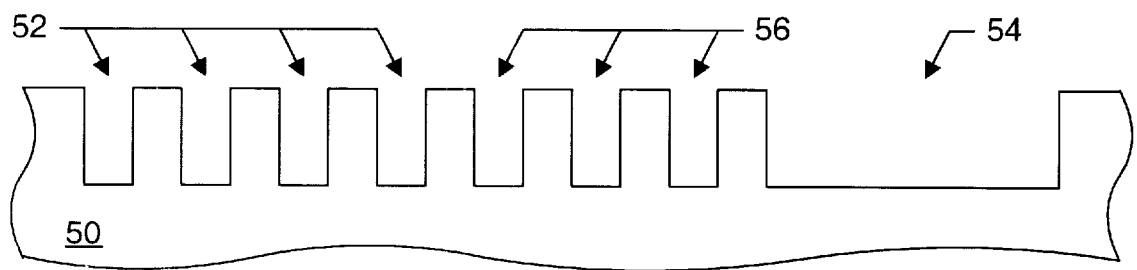


FIG. 5

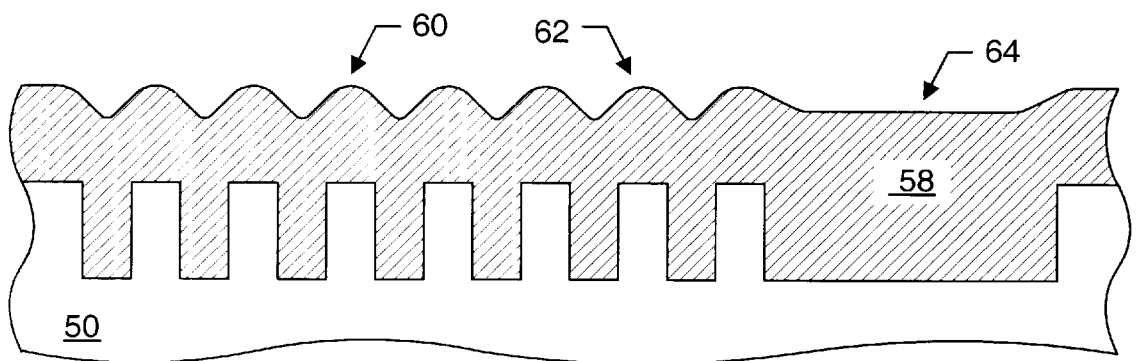


FIG. 6

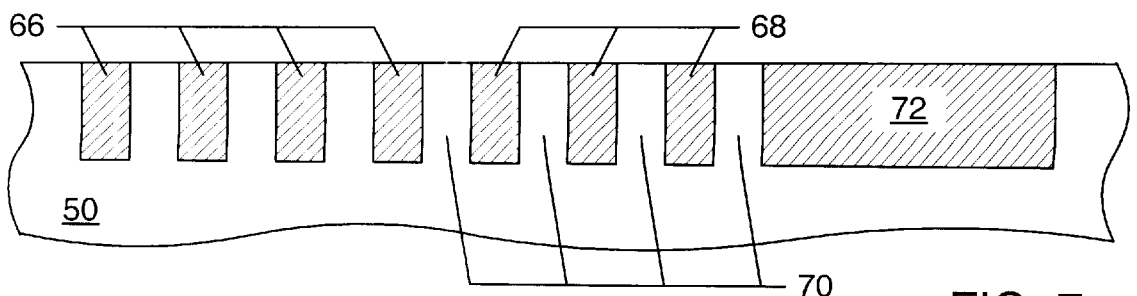


FIG. 7

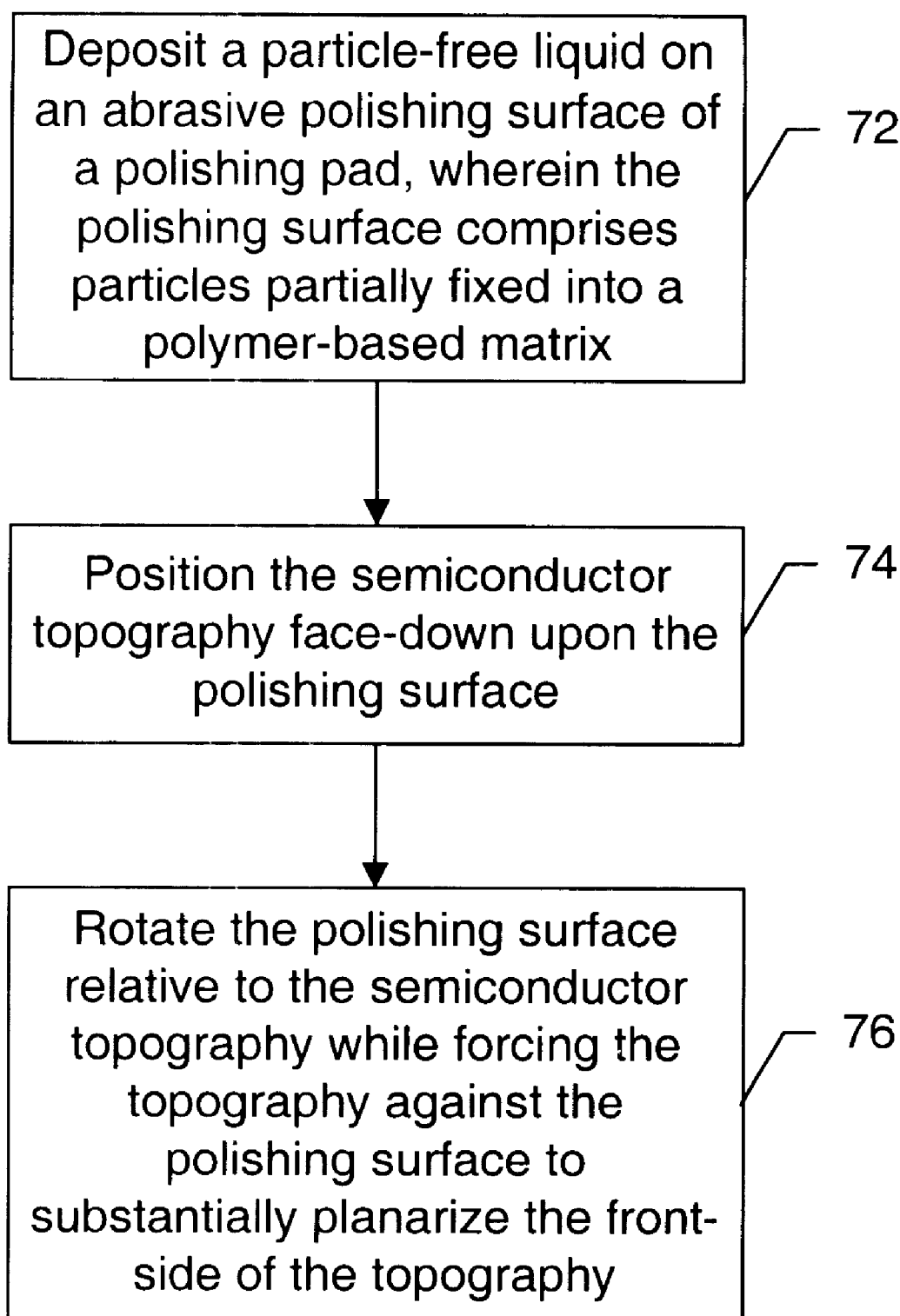


FIG. 8

**PLANARIZED SEMICONDUCTOR
INTERCONNECT TOPOGRAPHY AND
METHOD FOR POLISHING A METAL
LAYER TO FORM INTERCONNECT**

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to integrated circuit manufacturing and, more particularly, to a substantially planarized interconnect topography and method for making spaced interconnect by forming a plurality of dummy features in a dielectric layer between a relatively wide interconnect structure and a series of relatively narrow interconnect structures.

2. Description of the Related Art

Fabrication of an integrated circuit involves numerous processing steps. After implant regions (e.g., source/drain regions) have been placed within a semiconductor substrate and gate areas defined upon the substrate, an interlevel dielectric is formed across the topography to isolate the gate areas and the implant regions from overlying conducting regions. Interconnect routing is then patterned across the interlevel dielectric and connected to the implant regions and/or the gate areas by ohmic contacts formed through the interlevel dielectric. Alternating levels of interlevel dielectric and interconnect may be placed across the semiconductor topography to form a multi-level integrated circuit.

As successive layers are deposited across previously patterned layers of an integrated circuit, elevational disparities develop across the surface of each layer. If left unattended, the elevational disparities in each level of an integrated circuit can lead to various problems. For example, when a dielectric, conductive, or semiconductive material is deposited over a topological surface having elevationally raised and recessed regions, step coverage problems may arise. Step coverage is defined as a measure of how well a film conforms over an underlying step and is expressed by the ratio of the minimum thickness of a film as it crosses a step to the nominal thickness of the film over horizontal regions. Also, stringers may arise from incomplete etching over severe steps. Furthermore, correctly patterning layers upon a topological surface containing fluctuations in elevation may be difficult using optical lithography. The depth-of-focus of the lithography alignment system may vary depending upon whether the resist resides in an elevational "hill" or "valley" area. The presence of such elevational disparities therefore makes it difficult to print high resolution features.

Techniques involving chemical and mechanical abrasion (e.g., chemical-mechanical polishing) to planarize or remove the surface irregularities have grown in popularity. As shown in FIG. 1, a typical chemical-mechanical polishing ("CMP") process involves placing a semiconductor wafer 12 face-down on a polishing pad 14 which lies on or is attached to a rotatable table or platen 16. A popular polishing pad medium comprises polyurethane or polyurethane-impregnated polyester felts. During the CMP process, polishing pad 14 and semiconductor wafer 12 may be rotated while a carrier 10 holding wafer 12 applies a downward force F upon polishing pad 14. An abrasive, fluid-based chemical suspension, often referred to as a "slurry", is deposited from a conduit 18 positioned above pad 14 onto the surface of polishing pad 14. The slurry may fill the space between pad 14 and the surface of wafer 12. The polishing process may involve a chemical in the slurry reacting with the surface material being polished. The rotational movement of polishing pad 14 relative to wafer 12

causes abrasive particles entrained within the slurry to physically strip the reacted surface material from wafer 12. The pad 14 itself may also physically remove some material from the surface of the wafer 12. The abrasive slurry particles are typically composed of silica, alumina, or ceria.

CMP is commonly used to form a planarized level of an integrated circuit containing interconnect laterally spaced from each other in what is generally referred to as the "damascene" process. Laterally spaced trenches are first etched in an interlevel dielectric configured upon a semiconductor topography comprising electrically conductive features. A conductive material is then deposited into the trenches and on the interlevel dielectric between trenches to a level spaced above the upper surface of the interlevel dielectric. CMP is applied to the surface of the conductive material to remove that surface to a level substantially commensurate with that of the upper surface of the interlevel dielectric. In this manner, interconnect that are isolated from each other by the interlevel dielectric are formed exclusively in the trenches. CMP can planarize only localized regions of the interconnect surface such that all interconnect traces have a co-planar upper surface, provided certain conditions are met. The localized area must contain trenches that are consistently, and closely spaced from each other. Moreover the trenches must be relatively narrow in lateral dimension. If those rather restrictive requirements are not met, then thicknesses of a given interconnect layer can vary to such a degree that local regions of interconnect may suffer severe current carrying limitations.

In particular, planarization may become quite difficult in a region where there is a relatively large distance between a series of relatively narrow interconnect, or if there is a relatively wide interconnect such as that found in, for example, a bond pad. FIGS. 2-4 illustrate a typical damascene process and the localized thinning or "dishing" problem experienced by conventional metal CMP processes.

As shown in FIG. 2, a series of relatively narrow trenches 22 and a relatively wide trench 24 are formed in an interlevel dielectric 20 using well-known lithography and etch techniques. The series of narrow trenches 22 and the wide trench 24 are laterally separated by a region of interlevel dielectric having a smooth upper surface 26. FIG. 3 illustrates a conductive material 28, e.g., a metal, such as Al, W, Ta, and Ti, deposited across the topography to a level spaced above upper surface 26. Due to the conformal nature of the sputter or CVD process used to apply the conductive material, the conductive material takes on an upper surface topography having a first region 30 formed over closely spaced hill and valley areas spaced above the series of narrow trenches 22. The topography also includes a second region 32 having a single wide valley area spaced above the wide trench 24 and a substantially flat third region 34 spaced above smooth upper surface 26. Conductive material 28 is then polished, as shown in FIG. 4, using CMP to remove conductive material 28 from the upper surface of interlevel dielectric 20. As a result of CMP, a series of relatively narrow interconnect 36 are formed exclusively in narrow trenches 22 and a relatively wide interconnect 38 is formed exclusively in wide trench 24. The narrow interconnect 36 may serve to electrically connect underlying active devices and conductive elements of the semiconductor topography. The wide interconnect 38 may subsequently function as, e.g., a bond pad.

Unfortunately, the topological surface of the interconnect level is not absent of elevational disparity. That is, the upper surface of interconnect 38 includes a recessed area 42 that extends below a substantially planar upper surface 44 of interlevel dielectric 20. Recessed area 42 may result from a

phenomena known as the “dishing” effect. Dishing naturally results from the polishing pad flexing or conforming to the surface being polished. If the surface being polished is initially bowed or arcuate (i.e., is not planar), the polishing pad will take on the shape of the non-planar regions causing further dishing of the surface being polished. The CMP slurry initiates the polishing process by chemically reacting with the surface material in both elevated and recessed areas. Because of the deformation of the CMP pad, the reacted surface material in recessed areas may be physically stripped in addition to the reacted surface material in elevated areas. As such, a surface having fluctuations in elevation may continue to have some elevational disparity even after it has been subjected to CMP. The dishing effect is particularly a problem when forming a relatively wide interconnect between regions of a dielectric that is substantially more dense than the metal. While the dielectric is hard enough to support the overlying regions of the CMP pad, the metal is not, and thus allows significant flexing of the pad. Such flexing of the CMP pad causes the surface of the metal interconnect to become recessed relative to adjacent regions of the dielectric.

In addition, the topological surface includes a recessed area **40** arranged over the set of narrow interconnect **36**. It is believed that such a recessed area **40** forms due to so-called “oxide erosion” of interlevel dielectric **20**, assuming that the dielectric is composed of silicon oxide. The CMP slurry chosen to polish the metal of the interconnect includes a chemical component that reacts with metal at a faster rate than with oxide. As such, even after the metal surface has been removed to a level commensurate with that of the oxide surface, its removal may continue at a faster rate than that of the oxide. The metal surface thus becomes spaced below that of the oxide, creating steps in the topological surface. At this point, the relatively small, elevated oxide regions are removed by the CMP pad at a faster rate than large area oxide regions, or even the adjacent, recessed metal regions. Because the oxide outside the area comprising the densely packed interconnect has no elevational disparity, its removal rate is relatively slow. Therefore, the oxide in the dense interconnect area becomes recessed below the oxide outside the dense interconnect area.

It would therefore be desirable to develop a polishing process which can achieve global planarization across the entire topological surface of an interconnect level. Global planarization requires that the polish rate be uniform in all elevated areas of the topography. Such uniformity of the polish rate is particularly needed when polishing a topography having a set of interconnect which is of relatively narrow lateral dimension spaced from a relatively wide interconnect. Herein, narrow and wide refer to a lateral dimension which extends along the trench base perpendicular and co-planar with the elongated axis of the interconnect. That is, the dielectric in the space between the series of narrow interconnect and the wide interconnect needs to be polished as quickly as the interconnect are polished in order to assure both densely spaced narrow interconnects and sparsely spaced wide interconnects have a flat and relatively co-planar upper surface. The desirous polishing process must avoid problems typically arising during CMP, for example, metal dishing or oxide erosion.

SUMMARY OF THE INVENTION

The problems outlined above are in large part solved by an embodiment of the present invention in which a substantially planar semiconductor topography is formed by placing a plurality of dummy conductors in a dielectric layer

between a region defined by a relatively wide interconnect and another region defined by a series of relatively narrow interconnect. A plurality of electrically conductive features are embodied within the topography. The dielectric layer may be placed between an interconnect level and an underlying semiconductor substrate upon and within which active devices have been formed. Alternatively, the dielectric layer may be placed between successive interconnect levels. The dielectric layer may comprise a material having a relatively low dielectric constant, e.g. glass- or silicate-based dielectric, preferably oxide.

According to an embodiment, a plurality of laterally spaced dummy trenches are first etched in the dielectric layer between a relatively wide trench and a series of relatively narrow trenches. The widths, lengths, and depths of the dummy trenches, the wide trench, and the narrow trenches may vary according to design preferences and criteria. The lateral widths of the wide trench, the dummy trenches, and the narrow trenches are preferably greater than 50 microns, 1 to 5 microns, and less than 1 micron, respectively. The depth of the wide, dummy, and narrow trenches is preferably 2,000 Å to 1 micron. The dummy trenches, the wide trench, and the narrow trenches are filled with a conductive material, e.g., a metal, such as aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof. The conductive material is deposited to a level spaced above the upper surface of the dielectric layer. The surface of the conductive material is then polished to a level substantially coplanar with that of the upper surface of the dielectric layer. Advantageously, the polish rate of the conductive material above the dummy trenches and the wide and narrow trenches is substantially uniform. In this manner, dummy conductors spaced apart by dielectric protrusions are formed exclusively in the dummy trenches, and interconnect are formed exclusively in the narrow and wide trenches. The dummy conductors are electrically separate from electrically conductive features of the ensuing integrated circuit. As such, the dummy conductors preferably serve no purpose except to improve the planarization of the interconnect level in which they reside. The dummy conductors therefore do not contain transitory voltages and/or current associated with or connected to active and passive devices within the semiconductor topography. Most likely, the dummy conductors are connected to a power supply or ground, but not to any gate inputs or source/drain outputs of a active transistors, nor are they connected to any terminals of passive resistors or capacitors.

In one embodiment, the conductive material may be polished using well-known CMP. That is, the frontside of the semiconductor topography may be forced against a CMP polishing pad while the polishing pad and the topography are rotated relative to each other. A CMP slurry entrained with abrasive particles, e.g., ceria, silica, or alumina, is dispensed upon the polishing pad surface to aid in the removal of the conductive material. In an alternate embodiment, a “fixed-abrasive” technique is used to polish the conductive material. The fixed-abrasive technique involves placing a liquid which is substantially free of particulate matter between the surface of the conductive material and an abrasive polishing surface of a polishing pad. The liquid contains no chemical constituent that could react with the topography. The abrasive polishing surface is moved relative to the semiconductor topography so as to polish the conductive material. The liquid applied to the polishing surface preferably comprises deionized water, however, other liquids which have a near-neutral pH value may alternatively be directed onto the abrasive polishing

surface. The pH that is chosen for the polishing process is one suitable for the conductive material and the polishing pad. The polishing surface comprises a polymer-based matrix entrained with particles selected from the group consisting of cerium oxide, cerium dioxide, aluminum oxide, silicon dioxide, titanium oxide, chromium oxide, and zirconium oxide.

The abrasive polishing surface belongs to a polishing pad which is substantially resistant to deformation even when placed across an elevationally recessed region of relatively large lateral dimension (e.g., over 200 microns lateral dimension). Therefore, the pad is relatively non-conformal to the underlying surface and thus does not come in contact with elevationally recessed regions of the conductive material. It is believed that the particles dispersed throughout the abrasive polishing surface in combination with the polishing liquid interact chemically and physically with the elevated regions of the conductive material to remove those regions. However, the liquid alone may be incapable of removing the conductive material in elevationally recessed regions. As such, elevationally raised regions of the conductive material are removed at a substantially faster rate than elevationally recessed regions. The polish rate slows down significantly as the topological surface of the interconnect level approaches planarity.

Whatever polishing technique is applied to the conductive material, the presence of the plurality of dummy conductors between the series of relatively narrow interconnect and the relatively wide interconnect provides for global planarization of the topography employing the trenches. In particular, the dummy conductors and the interposing dielectric protrusions replace a relatively wide dielectric region absent of any conductive material. It is theorized that the metal of the dummy conductors, being softer than the dielectric, contracts when a polishing pad is forced against it. Consequently, the surface of the polishing pad extending over the dummy conductors and the wide interconnect during polishing remains substantially flat when pressure is applied thereto. That is, the surface area of the dielectric protrusions between the dummy conductors is not sufficient to withstand the force of the polishing pad, and thus does not cause the pad to flex. Therefore, dishing of the conductive material in the wide trench is less likely to occur as a result of the polishing process.

Also, the dummy conductors help prevent surface disparity that could result from erosion of the dielectric layer. The conductive material may continue to be polished more rapidly than the dielectric once the surface of the conductive material has been removed to the same elevational plane as the dielectric. The dielectric protrusions between the dummy conductors and the closely spaced narrow interconnect may thus become elevated above the conductive material. Consequently, the entire topological surface of the interconnect level has surface disparities, causing the polish rate of the elevated dielectric protrusions to become greater than that of the recessed dummy conductors and interconnect. As the polishing process continues, the dielectric protrusions are again made substantially coplanar with the dummy conductors and the interconnect. This cycle may be repeated until it is desirable to stop the polishing process.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the accompanying drawings in which:

FIG. 1 depicts a side plan view of an apparatus that may be used to chemical-mechanical polish a semiconductor topography;

FIG. 2 depicts a partial cross-sectional view of a conventional semiconductor topography, wherein a series of relatively narrow trenches are formed within an interlevel dielectric a spaced distance from a relatively wide trench;

FIG. 3 depicts a partial cross-sectional view of the semiconductor topography, wherein a conductive material is deposited into the trenches to a level spaced above an upper surface of the interlevel dielectric;

FIG. 4 depicts a partial cross-sectional view of the semiconductor topography, wherein the surface of the conductive material is removed from the upper surface of the interlevel dielectric using a conventional CMP technique, thereby forming a topological surface having elevational disparities;

FIG. 5 depicts a partial cross-sectional view of a semiconductor topography according to an embodiment of the present invention, wherein a plurality of laterally spaced dummy trenches are formed in a dielectric layer between a relatively wide trench and a series of relatively narrow trenches;

FIG. 6 is a partial cross-sectional view of the semiconductor topography, wherein a conductive material is deposited into the dummy trenches, the narrow trenches, and the wide trench to a level spaced above the upper surface of the dielectric layer;

FIG. 7 is a partial cross-sectional view of the semiconductor topography, wherein the surface of the conductive material is removed to a level substantially commensurate with that of the upper surface of the dielectric layer using a planarization process according to an embodiment of the present invention, thereby forming a planarized topological surface; and

FIG. 8 is a process flow diagram of a fixed-abrasive polishing technique that may be used to polish the conductive material.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the appended claims.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Turning to FIG. 5, a partial cross-section of a semiconductor topography is presented. Electrically conductive features may be embodied within the topography. A dielectric layer 50 is shown which may comprise a dielectric material having a relatively low dielectric constant. Dielectric layer 50 may comprise, e.g., a glass- or silicate-based material, such as an oxide that has been deposited by chemical-vapor deposition ("CVD") from either a tetraethyl orthosilicate ("TEOS") source or a silane source and doped with an impurity, e.g., boron or phosphorus. Dielectric layer 50 may serve as a poly-metal interlevel dielectric ("PMD") between a doped polycrystalline silicon ("polysilicon") gate layer and an ensuing metal interconnect layer. It is to be understood that the gate layer may comprise other conductive materials besides polysilicon. Alternatively, dielectric 50 may form an

inter-metal interlevel dielectric ("IMD") between an underlying metal interconnect layer and an ensuing overlying metal interconnect layer.

A plurality of dummy trenches 56 may be formed in dielectric layer 50 between a series of relatively narrow trenches 52 and a relatively wide trench 54. While the dimensions of these trenches may vary depending on the design specifications, the dummy trenches 56 are preferably 1 to 5 microns in width, the narrow trenches 52 preferably have sub-micron widths, and the wide trench 54 is preferably greater than 50 microns in width. Also, the depths of all the trenches may range from 2,000 Å to 1 micron. Further, the set of relatively narrow trenches 52 may be spaced apart by a distance of less than 1 micron and from the relatively wide trench 54 by a distance greater than 50 microns. Although the spacing between dummy trenches 56 may vary, this spacing may, e.g., range from 0.5 micron to 50 micron. The trenches may be formed by lithographically patterning a photoresist layer upon dielectric layer 50 to expose select portions of the depicted dielectric. The select portion of dielectric layer 50 not covered by the patterned photoresist is then etched using an etch technique, e.g., a CF₄ plasma etch.

As shown in FIG. 6, a conductive material 58 may subsequently be deposited into the trenches and across dielectric layer 50 to a level spaced above the uppermost horizontal surface of dielectric layer 50. Conductive material 58 may comprise a metal, e.g., aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof. Such a metal may be sputter deposited from a metal target or MOCVD (i.e., metal organic CVD) deposited from a metal organic source. The as-deposited conductive material 58 has an elevationally disparate surface that includes a first region 60 above narrow trenches 52, a second region 62 above dummy trenches 56, and a third region 64 above wide trench 54. The valley areas of regions 60, 62, and 64 are directly above respective trenches, while the hill areas are directly above respective dielectric protrusions that are positioned between the trenches.

Turning to FIG. 7, conductive material 58 may then be polished to a level substantially coplanar with the uppermost surface of dielectric layer 50. As a result of polishing conductive material 58, relatively narrow interconnect 66 are formed exclusively in trenches 52, dummy conductors 68 are formed in dummy trenches 56, and a relatively wide interconnect 72 is formed in trench 54. Dummy conductors 68 are laterally spaced from each other and/or from interconnect 66 and 72 by dummy dielectric protrusions 70. Placing dummy conductors 68 in the region between the series of narrow interconnect 66 and the wide interconnect 72 affords global planarization of the topological surface. That is, the polish rate is substantially uniform across the entire topological surface. Also, the polish rate of elevationally raised regions is greater than that of elevationally recessed regions. Further, a surface having elevational disparity is polished at a faster rate than a substantially flat surface.

It is believed that the presence of dummy conductors 68 helps prevent the polishing pad from deforming about the length of the pad into relatively wide trench 54 when subjected to normal pressure. Further, it is postulated that placing dummy conductors 68 between dummy dielectric protrusions 70 ensures that elevational fluctuations are present in different regions of the topological surface at the same time. That is, no particular region of the topological surface becomes substantially planarized before other regions and thereby causes fluctuations in the polish rate

across the surface. Thus, the polish rate does not slow down until the entire topological surface is substantially free of elevational disparity.

Dummy conductors 68 are not connected to any active or passive device which forms an integrated circuit of the semiconductor topography shown in FIG. 7. While dummy conductors can carry power or ground voltages, they do not carry transitory voltages or current associated with an operable circuit. Nor are they associated or connected in any way with active circuit elements and/or features such as a contact, implant, gate, etc., of a transistor, capacitor, resistor, etc.

FIG. 8 illustrates a process flow diagram of a fixed abrasive CMP technique that may be used to polish conductive material 58, and thereby form the substantially planar topography shown in FIG. 7. Conductive material 58 may be polished using an apparatus similar in some respects to that shown in FIG. 1. The apparatus in FIG. 1 may be purposefully modified to accommodate an abrasive polishing surface and a conduit for delivering a particle-free solution to the polishing surface. Alternatively, a conventional CMP process may be employed for polishing conductive material 58. The CMP slurry may include a component that chemically reacts with conductive material 58.

As described in block 72, a particle-free liquid is dispensed onto an abrasive polishing surface of a polishing pad having a substantially rigid supportive backing. An appropriate polishing pad is commercially available from Minnesota Mining and Manufacturing Company. The polishing surface comprises a polymer-based matrix entrained with abrasive particles. Appropriate materials that may be used for the particles include, but are not limited to, ceria, α alumina, γ alumina, silicon dioxide, titania, chromia, and zirconia. Preferably, the polishing liquid forwarded onto the abrasive polishing surface is deionized water. The polishing liquid may also be other types of liquids which have a near-neutral pH. As shown in block 74 of FIG. 8, the semiconductor topography depicted in FIG. 6 may be positioned face-down upon the polishing surface. The polishing liquid is positioned at the interface between the semiconductor topography and the abrasive polishing surface.

As indicated by block 76 of FIG. 8, the semiconductor topography and the abrasive polishing surface may be rotated relative to each other while the frontside of the topography is forced against the polishing surface. It is believed that contact between the high elevation regions of conductive material 58 and the abrasive particles as well as the polishing liquid causes the surface material of conductive material 58 in those elevated regions to be released from bondage with the bulk of the conductive material. The particles extending from the abrasive polishing surface have a sufficient hardness to dislodge the reacted surface material during abrasion of the high elevation regions. The rigidity of the polishing pad may be sufficient to prevent the abrasive polishing surface from contacting recessed regions of conductive material 58. Accordingly, very little of the conductive material 58 in the recessed regions is removed.

It will be appreciated to those skilled in the art having the benefit of this disclosure that this invention is believed to provide a method for forming a substantially planar semiconductor topography by placing a plurality of dummy conductors in a dielectric layer laterally between a relatively wide interconnect and a series of relatively narrow interconnect. Further modifications and alternative embodiments of various aspects of the invention will be apparent to those skilled in the art in view of this description. For example,

electrically conductive features isolated from each other by a dielectric may subsequently be formed upon the planarized semiconductor topography. It is intended that the following claims be interpreted to embrace all such modifications and changes and, accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

What is claimed is:

1. A method for providing a substantially planar semiconductor topography which extends above a plurality of electrically conductive features that form an integrated circuit, comprising:

etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches, wherein a lateral dimension of said first trench is greater than a lateral dimension of said second trenches;

filling said dummy trenches and said first and second trenches with a conductive material; and

polishing said conductive material to form dummy conductors exclusively in said dummy trenches and interconnect exclusively in said first and second trenches, wherein said dummy conductors are electrically separate from said plurality of electrically conductive features and co-planar with said interconnect.

2. The method of claim 1, wherein said conductive material comprises a metal selected from the group consisting of aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof.

3. The method of claim 1, wherein said polishing said conductive material is performed at a substantially uniform polish rate above said dummy trenches and said first and second trenches.

4. The method of claim 1, wherein said polishing results in dummy dielectric protrusions between adjacent pairs of said dummy trenches, said dummy dielectric protrusions having first upper surfaces substantially coplanar with second upper surfaces of said dummy conductors.

5. The method of claim 1, wherein said polishing comprises applying an abrasive polishing surface to an upper surface of said conductive material while moving the abrasive polishing surface relative to the upper surface.

6. The method of claim 5, wherein said polishing comprises applying a liquid substantially free of particulate matter between said abrasive polishing surface and said conductive material.

7. The method of claim 5, wherein said abrasive polishing surface comprises particles at least partially fixed into a polymer-based matrix, and wherein said particles comprise a material selected from the group consisting of cerium oxide, cerium dioxide, aluminum oxide, silicon dioxide, titanium oxide, chromium oxide, and zirconium oxide.

8. The method of claim 1, wherein said polishing comprises placing a CMP slurry onto a polishing pad surface, and contacting said polishing pad surface with an upper surface of said conductive material while rotating said polishing pad surface relative to said upper surface.

9. A method for providing a semiconductor topography having a plurality of electrically conductive features and a topography which is substantially planar, comprising:

etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench which is to receive a first interconnect feature and a series of second trenches which are to receive a second interconnect feature, wherein lateral dimensions of said first trench and said first interconnect feature are greater than corresponding lateral dimensions of said second trenches and said second interconnect feature;

filling said plurality of dummy trenches with a conductive material; and

polishing said conductive material to form dummy conductors bounded exclusively within said dummy trenches electrically separate from said electrically conductive features, and such that first upper surfaces of said dummy conductors are substantially co-planar with second upper surfaces of said first and second interconnect features.

10. The method of claim 9, wherein said conductive material comprises a metal selected from the group consisting of aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof.

11. The method of claim 9, wherein said polishing said conductive material is performed at a substantially uniform polish rate above said dummy trenches and said first and second trenches.

12. The method of claim 9, wherein said polishing results in dummy dielectric protrusions between adjacent pairs of said dummy trenches, said dummy dielectric protrusions having first upper surfaces substantially coplanar with second upper surfaces of said dummy conductors.

13. The method of claim 9, wherein said polishing comprises applying an abrasive polishing surface to an upper surface of said conductive material while moving the abrasive polishing surface relative to said upper surface.

14. The method of claim 13, wherein said polishing further comprises applying a liquid substantially free of particulate matter between said abrasive polishing surface and said upper surface of said conductive material.

15. The method of claim 13, wherein said abrasive polishing surface comprises particles at least partially fixed into a polymer-based matrix, and wherein said particles comprise a material selected from the group consisting of cerium oxide, cerium dioxide, aluminum oxide, silicon dioxide, titanium oxide, chromium oxide, and zirconium oxide.

16. The method of claim 9, wherein said polishing comprises placing a CMP slurry onto a polishing pad surface, and contacting said polishing pad surface with an upper surface of said conductive material while rotating said polishing pad surface relative to said upper surface.

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EXHIBIT B



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(54) **PLANARIZED SEMICONDUCTOR
INTERCONNECT TOPOGRAPHY AND
METHOD FOR POLISHING A METAL
LAYER TO FORM INTERCONNECT**

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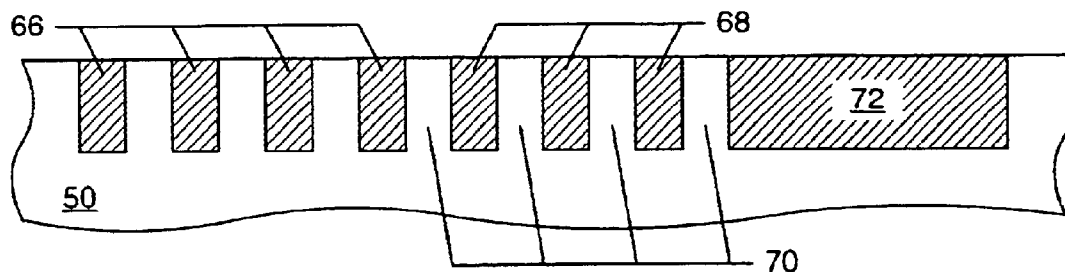
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(57) **ABSTRACT**

The present invention advantageously provides a substantially planarized semiconductor topography and method for making the same by forming a plurality of dummy features in a dielectric layer between a relatively wide interconnect and a series of relatively narrow interconnect. According to an embodiment, a plurality of laterally spaced dummy trenches are first etched in the dielectric layer between a relatively wide trench and a series of relatively narrow trenches. The dummy trenches, the wide trench, and the narrow trenches are filled with a conductive material, e.g., a metal. The conductive material is deposited to a level spaced above the upper surface of the dielectric layer. The surface of the conductive material is then polished to a level substantially coplanar with that of the upper surface of the dielectric layer. Advantageously, the polish rate of the conductive material above the dummy trenches and the wide and narrow trenches is substantially uniform. In this manner, dummy conductors spaced apart by dielectric protrusions are formed exclusively in the dummy trenches, and interconnect are formed exclusively in the narrow and wide trenches. The topological surface of the resulting interconnect level is substantially void of surface disparity.

22 Claims, 3 Drawing Sheets



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U.S. Patent

Feb. 1, 2005

Sheet 1 of 3

US 6,849,946 B2

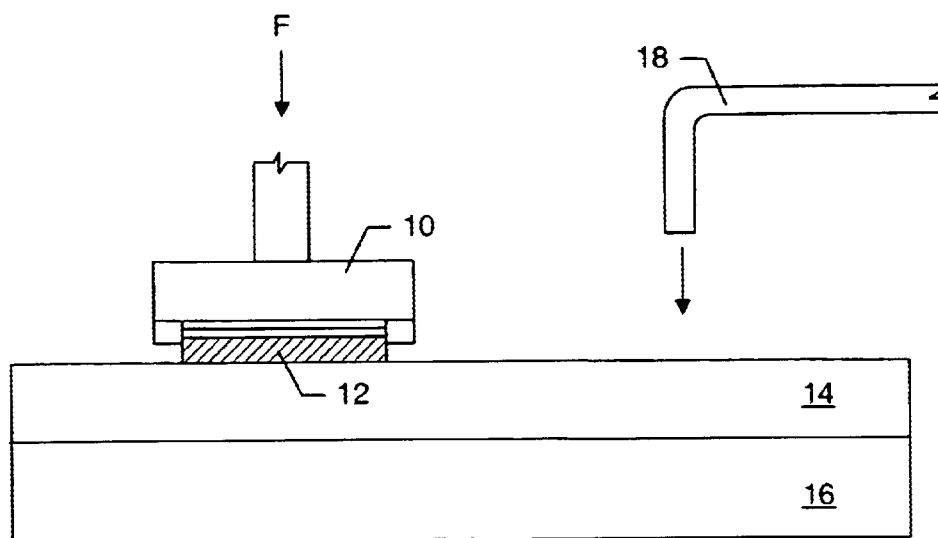


FIG. 1
(Related Art)

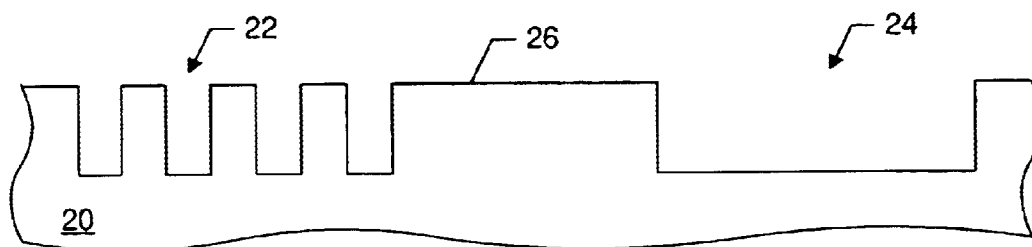


FIG. 2
(Related Art)

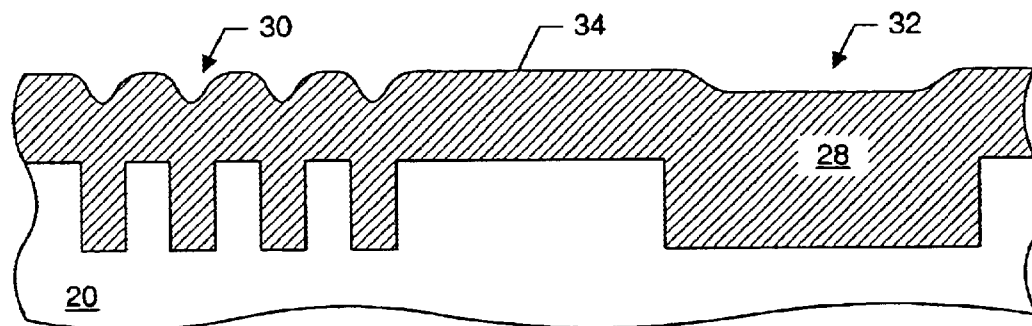
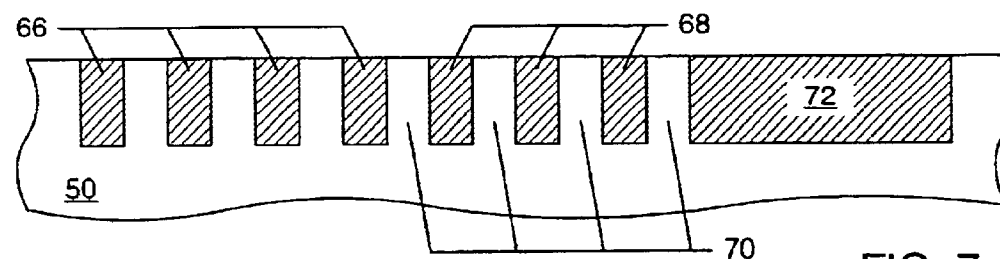
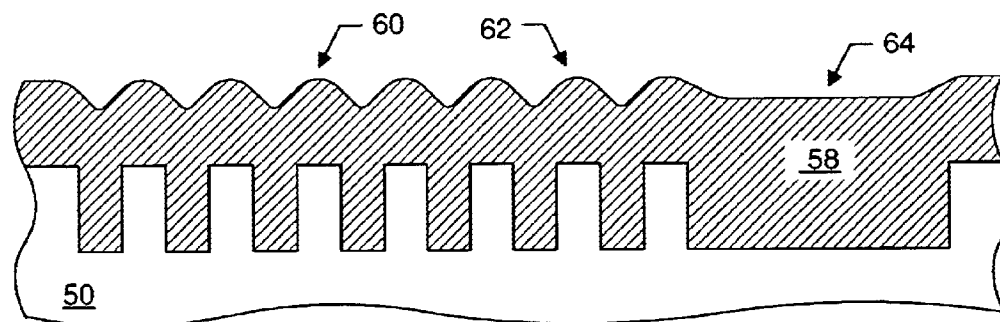
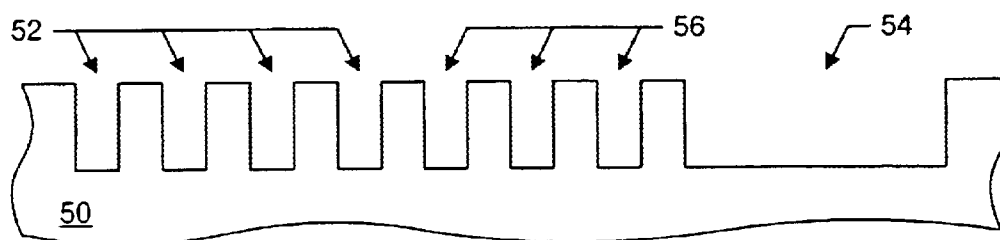
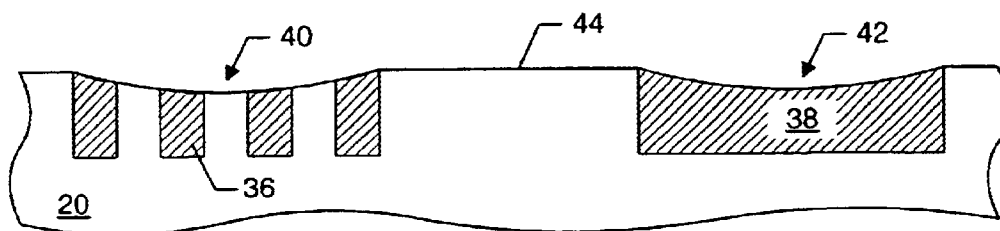


FIG. 3
(Related Art)



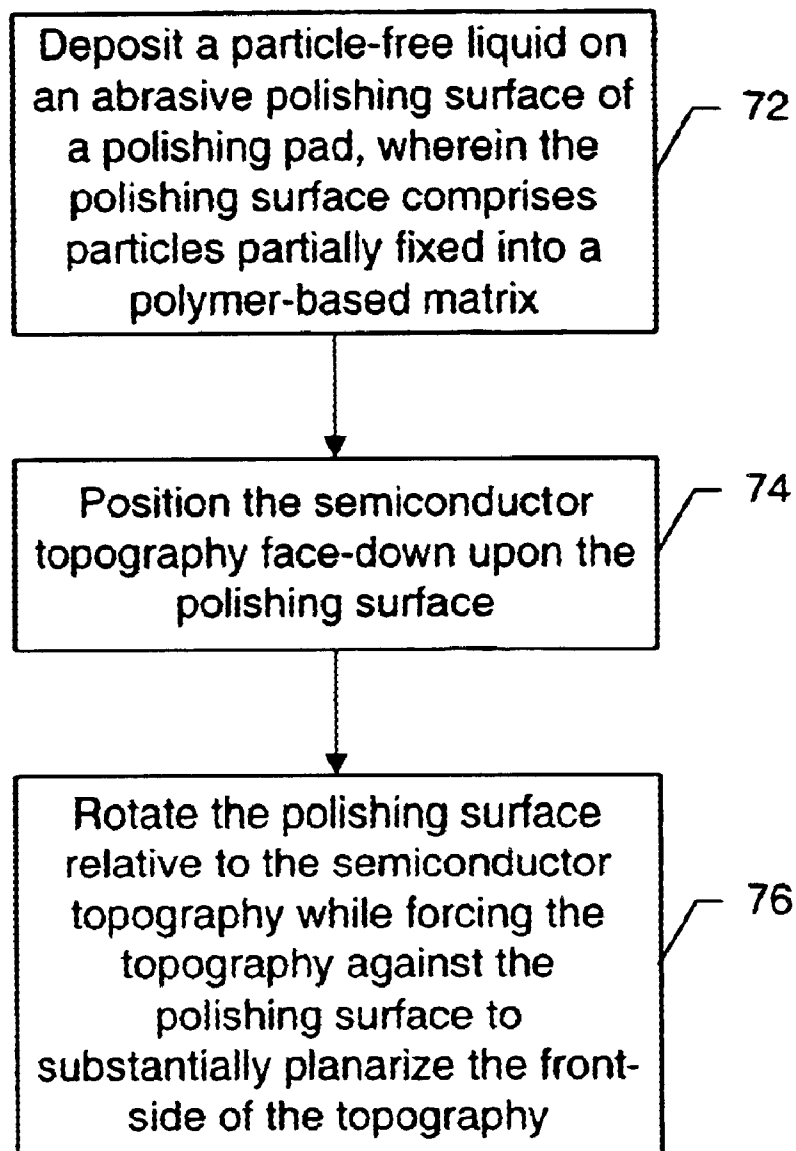


FIG. 8

US 6,849,946 B2

1

PLANARIZED SEMICONDUCTOR INTERCONNECT TOPOGRAPHY AND METHOD FOR POLISHING A METAL LAYER TO FORM INTERCONNECT

This is a continuation application from prior application Ser. No. 09/143,723, filed Aug. 31, 1998, which is now U.S. Pat. No. 6,232,231.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to integrated circuit manufacturing and, more particularly, to a substantially planarized interconnect topography and method for making spaced interconnect by forming a plurality of dummy features in a dielectric layer between a relatively wide interconnect structure and a series of relatively narrow interconnect structures.

2. Description of the Related Art

Fabrication of an integrated circuit involves numerous processing steps. After implant regions (e.g., source/drain regions) have been placed within a semiconductor substrate and gate areas defined upon the substrate, an interlevel dielectric is formed across the topography to isolate the gate areas and the implant regions from overlying conducting regions. Interconnect routing is then patterned across the interlevel dielectric and connected to the implant regions and/or the gate areas by ohmic contacts formed through the interlevel dielectric. Alternating levels of interlevel dielectric and interconnect may be placed across the semiconductor topography to form a multi-level integrated circuit.

As successive layers are deposited across previously patterned layers of an integrated circuit, elevational disparities develop across the surface of each layer. If left unattended, the elevational disparities in each level of an integrated circuit can lead to various problems. For example, when a dielectric, conductive, or semiconductive material is deposited over a topological surface having elevationally raised and recessed regions, step coverage problems may arise. Step coverage is defined as a measure of how well a film conforms over an underlying step and is expressed by the ratio of the minimum thickness of a film as it crosses a step to the nominal thickness of the film over horizontal regions. Also, stringers may arise from incomplete etching over severe steps. Furthermore, correctly patterning layers upon a topological surface containing fluctuations in elevation may be difficult using optical lithography. The depth-of-focus of the lithography alignment system may vary depending upon whether the resist resides in an elevational "hill" or "valley" area. The presence of such elevational disparities therefore makes it difficult to print high resolution features.

Techniques involving chemical and mechanical abrasion (e.g., chemical-mechanical polishing) to planarize or remove the surface irregularities have grown in popularity. As shown in FIG. 1, a typical chemical-mechanical polishing ("CMP") process involves placing a semiconductor wafer 12 face-down on a polishing pad 14 which lies on or is attached to a rotatable table or platen 16. A popular polishing pad medium comprises polyurethane or polyurethane-impregnated polyester felts. During the CMP process, polishing pad 14 and semiconductor wafer 12 may be rotated while a carrier 10 holding wafer 12 applies a downward force F upon polishing pad 14. An abrasive, fluid-based chemical suspension, often referred to as a "slurry", is deposited from a conduit 18 positioned above pad 14 onto the surface of polishing pad 14. The slurry may

2

fill the space between pad 14 and the surface of wafer 12. The polishing process may involve a chemical in the slurry reacting with the surface material being polished. The rotational movement of polishing pad 14 relative to wafer 12 causes abrasive particles entrained within the slurry to physically strip the reacted surface material from wafer 12. The pad 14 itself may also physically remove some material from the surface of the wafer 12. The abrasive slurry particles are typically composed of silica, alumina, or ceria.

CMP is commonly used to form a planarized level of an integrated circuit containing interconnect laterally spaced from each other in what is generally referred to as the "damascene" process. Laterally spaced trenches are first etched in an interlevel dielectric configured upon a semiconductor topography comprising electrically conductive features. A conductive material is then deposited into the trenches and on the interlevel dielectric between trenches to a level spaced above the upper surface of the interlevel dielectric. CMP is applied to the surface of the conductive material to remove that surface to a level substantially commensurate with that of the upper surface of the interlevel dielectric. In this manner, interconnect that are isolated from each other by the interlevel dielectric are formed exclusively in the trenches. CMP can planarize only localized regions of the interconnect surface such that all interconnect traces have a co-planar upper surface, provided certain conditions are met. The localized area must contain trenches that are consistently, and closely spaced from each other. Moreover the trenches must be relatively narrow in lateral dimension. If those rather restrictive requirements are not met, then thicknesses of a given interconnect layer can vary to such a degree that local regions of interconnect may suffer severe current carrying limitations.

In particular, planarization may become quite difficult in a region where there is a relatively large distance between a series of relatively narrow interconnect, or if there is a relatively wide interconnect such as that found in, for example, a bond pad. FIGS. 2-4 illustrate a typical damascene process and the localized thinning or "dishing" problem experienced by conventional metal CMP processes.

As shown in FIG. 2, a series of relatively narrow trenches 22 and a relatively wide trench 24 are formed in an interlevel dielectric 20 using well-known lithography and etch techniques. The series of narrow trenches 22 and the wide trench 24 are laterally separated by a region of interlevel dielectric having a smooth upper surface 26. FIG. 3 illustrates a conductive material 28, e.g., a metal, such as Al, W, Ta, and Ti, deposited across the topography to a level spaced above upper surface 26. Due to the conformal nature of the sputter or CVD process used to apply the conductive material, the conductive material takes on an upper surface topography having a first region 30 formed over closely spaced hill and valley areas spaced above the series of narrow trenches 22. The topography also includes a second region 32 having a single wide valley area spaced above the wide trench 24 and a substantially flat third region 34 spaced above smooth upper surface 26. Conductive material 28 is then polished, as shown in FIG. 4, using CMP to remove conductive material 28 from the upper surface of interlevel dielectric 20. As a result of CMP, a series of relatively narrow interconnect 36 are formed exclusively in narrow trenches 22 and a relatively wide interconnect 38 is formed exclusively in wide trench 24. The narrow interconnect 36 may serve to electrically connect underlying active devices and conductive elements of the semiconductor topography. The wide interconnect 38 may subsequently function as, e.g., a bond pad.

Unfortunately, the topological surface of the interconnect level is not absent of elevational disparity. That is, the upper

US 6,849,946 B2

3

surface of interconnect **38** includes a recessed area **42** that extends below a substantially planar upper surface **44** of interlevel dielectric **20**. Recessed area **42** may result from a phenomena known as the “dishing” effect. Dishing naturally results from the polishing pad flexing or conforming to the surface being polished. If the surface being polished is initially bowed or arcuate (i.e., is not planar), the polishing pad will take on the shape of the non-planar regions causing further dishing of the surface being polished. The CMP slurry initiates the polishing process by chemically reacting with the surface material in both elevated and recessed areas. Because of the deformation of the CMP pad, the reacted surface material in recessed areas may be physically stripped in addition to the reacted surface material in elevated areas. As such, a surface having fluctuations in elevation may continue to have some elevational disparity even after it has been subjected to CMP. The dishing effect is particularly a problem when forming a relatively wide interconnect between regions of a dielectric that is substantially more dense than the metal. While the dielectric is hard enough to support the overlying regions of the CMP pad, the metal is not, and thus allows significant flexing of the pad. Such flexing of the CMP pad causes the surface of the metal interconnect to become recessed relative to adjacent regions of the dielectric.

In addition, the topological surface includes a recessed area **40** arranged over the set of narrow interconnect **36**. It is believed that such a recessed area **40** forms due to so-called “oxide erosion” of interlevel dielectric **20**, assuming that the dielectric is composed of silicon oxide. The CMP slurry chosen to polish the metal of the interconnect includes a chemical component that reacts with metal at a faster rate than with oxide. As such, even after the metal surface has been removed to a level commensurate with that of the oxide surface, its removal may continue at a faster rate than that of the oxide. The metal surface thus becomes spaced below that of the oxide, creating steps in the topological surface. At this point, the relatively small, elevated oxide regions are removed by the CMP pad at a faster rate than large area oxide regions, or even the adjacent, recessed metal regions. Because the oxide outside the area comprising the densely packed interconnect has no elevational disparity, its removal rate is relatively slow. Therefore, the oxide in the dense interconnect area becomes recessed below the oxide outside the dense interconnect area.

It would therefore be desirable to develop a polishing process which can achieve global planarization across the entire topological surface of an interconnect level. Global planarization requires that the polish rate be uniform in all elevated areas of the topography. Such uniformity of the polish rate is particularly needed when polishing a topography having a set of interconnect which is of relatively narrow lateral dimension spaced from a relatively wide interconnect. Herein, narrow and wide refer to a lateral dimension which extends along the trench base perpendicular and co-planar with the elongated axis of the interconnect. That is, the dielectric in the space between the series of narrow interconnect and the wide interconnect needs to be polished as quickly as the interconnect are polished in order to assure both densely spaced narrow interconnects and sparsely spaced wide interconnects have a flat and relatively co-planar upper surface. The desirous polishing process must avoid problems typically arising during CMP, for example, metal dishing or oxide erosion.

SUMMARY OF THE INVENTION

The problems outlined above are in large part solved by an embodiment of the present invention in which a substan-

4

tially planar semiconductor topography is formed by placing a plurality of dummy conductors in a dielectric layer between a region defined by a relatively wide interconnect and another region defined by a series of relatively narrow interconnect. A plurality of electrically conductive features are embodied within the topography. The dielectric layer may be placed between an interconnect level and an underlying semiconductor substrate upon and within which active devices have been formed. Alternatively, the dielectric layer may be placed between successive interconnect levels. The dielectric layer may comprise a material having a relatively low dielectric constant, e.g. glass- or silicate-based dielectric, preferably oxide.

According to an embodiment, a plurality of laterally spaced dummy trenches are first etched in the dielectric layer between a relatively wide trench and a series of relatively narrow trenches. The widths, lengths, and depths of the dummy trenches, the wide trench, and the narrow trenches may vary according to design preferences and criteria. The lateral widths of the wide trench, the dummy trenches, and the narrow trenches are preferably greater than 50 microns, 1 to 5 microns, and less than 1 micron, respectively. The depth of the wide, dummy, and narrow trenches is preferably 2,000 Å to 1 micron. The dummy trenches, the wide trench, and the narrow trenches are filled with a conductive material, e.g., a metal, such as aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof. The conductive material is deposited to a level spaced above the upper surface of the dielectric layer. The surface of the conductive material is then polished to a level substantially coplanar with that of the upper surface of the dielectric layer. Advantageously, the polish rate of the conductive material above the dummy trenches and the wide and narrow trenches is substantially uniform. In this manner, dummy conductors spaced apart by dielectric protrusions are formed exclusively in the dummy trenches, and interconnect are formed exclusively in the narrow and wide trenches. The dummy conductors are electrically separate from electrically conductive features of the ensuing integrated circuit. As such, the dummy conductors preferably serve no purpose except to improve the planarization of the interconnect level in which they reside. The dummy conductors therefore do not contain transitory voltages and/or current associated with or connected to active and passive devices within the semiconductor topography. Most likely, the dummy conductors are connected to a power supply or ground, but not to any gate inputs or source/drain outputs of a active transistors, nor are they connected to any terminals of passive resistors or capacitors.

In one embodiment, the conductive material may be polished using well-known CMP. That is, the frontside of the semiconductor topography may be forced against a CMP polishing pad while the polishing pad and the topography are rotated relative to each other. A CMP slurry entrained with abrasive particles, e.g., ceria, silica, or alumina, is dispensed upon the polishing pad surface to aid in the removal of the conductive material. In an alternate embodiment, a “fixed-abrasive” technique is used to polish the conductive material. The fixed-abrasive technique involves placing a liquid which is substantially free of particulate matter between the surface of the conductive material and an abrasive polishing surface of a polishing pad. The liquid contains no chemical constituent that could react with the topography. The abrasive polishing surface is moved relative to the semiconductor topography so as to polish the conductive material. The liquid applied to the polishing surface preferably comprises deionized water,

US 6,849,946 B2

5

however, other liquids which have a near-neutral pH value may alternatively be directed onto the abrasive polishing surface. The pH that is chosen for the polishing process is one suitable for the conductive material and the polishing pad. The polishing surface comprises a polymer-based matrix entrained with particles selected from the group consisting of cerium oxide, cerium dioxide, aluminum oxide, silicon dioxide, titanium oxide, chromium oxide, and zirconium oxide.

The abrasive polishing surface belongs to a polishing pad which is substantially resistant to deformation even when placed across an elevationally recessed region of relatively large lateral dimension (e.g., over 200 microns lateral dimension). Therefore, the pad is relatively non-conformal to the underlying surface and thus does not come in contact with elevationally recessed regions of the conductive material. It is believed that the particles dispersed throughout the abrasive polishing surface in combination with the polishing liquid interact chemically and physically with the elevated regions of the conductive material to remove those regions. However, the liquid alone may be incapable of removing the conductive material in elevationally recessed regions. As such, elevationally raised regions of the conductive material are removed at a substantially faster rate than elevationally recessed regions. The polish rate slows down significantly as the topological surface of the interconnect level approaches planarity.

Whatever polishing technique is applied to the conductive material, the presence of the plurality of dummy conductors between the series of relatively narrow interconnect and the relatively wide interconnect provides for global planarization of the topography employing the trenches. In particular, the dummy conductors and the interposing dielectric protrusions replace a relatively wide dielectric region absent of any conductive material. It is theorized that the metal of the dummy conductors, being softer than the dielectric, contracts when a polishing pad is forced against it. Consequently, the surface of the polishing pad extending over the dummy conductors and the wide interconnect during polishing remains substantially flat when pressure is applied thereto. That is, the surface area of the dielectric protrusions between the dummy conductors is not sufficient to withstand the force of the polishing pad, and thus does not cause the pad to flex. Therefore, dishing of the conductive material in the wide trench is less likely to occur as a result of the polishing process.

Also, the dummy conductors help prevent surface disparity that could result from erosion of the dielectric layer. The conductive material may continue to be polished more rapidly than the dielectric once the surface of the conductive material has been removed to the same elevational plane as the dielectric. The dielectric protrusions between the dummy conductors and the closely spaced narrow interconnect may thus become elevated above the conductive material. Consequently, the entire topological surface of the interconnect level has surface disparities, causing the polish rate of the elevated dielectric protrusions to become greater than that of the recessed dummy conductors and interconnect. As the polishing process continues, the dielectric protrusions are again made substantially coplanar with the dummy conductors and the interconnect. This cycle may be repeated until it is desirable to stop the polishing process.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the accompanying drawings in which:

6

FIG. 1 depicts a side plan view of an apparatus that may be used to chemical-mechanical polish a semiconductor topography;

FIG. 2 depicts a partial cross-sectional view of a conventional semiconductor topography, wherein a series of relatively narrow trenches are formed within an interlevel dielectric a spaced distance from a relatively wide trench;

FIG. 3 depicts a partial cross-sectional view of the semiconductor topography, wherein a conductive material is deposited into the trenches to a level spaced above an upper surface of the interlevel dielectric;

FIG. 4 depicts a partial cross-sectional view of the semiconductor topography, wherein the surface of the conductive material is removed from the upper surface of the interlevel dielectric using a conventional CMP technique, thereby forming a topological surface having elevational disparities;

FIG. 5 depicts a partial cross-sectional view of a semiconductor topography according to an embodiment of the present invention, wherein a plurality of laterally spaced dummy trenches are formed in a dielectric layer between a relatively wide trench and a series of relatively narrow trenches;

FIG. 6 is a partial cross-sectional view of the semiconductor topography, wherein a conductive material is deposited into the dummy trenches, the narrow trenches, and the wide trench to a level spaced above the upper surface of the dielectric layer;

FIG. 7 is a partial cross-sectional view of the semiconductor topography, wherein the surface of the conductive material is removed to a level substantially commensurate with that of the upper surface of the dielectric layer using a planarization process according to an embodiment of the present invention, thereby forming a planarized topological surface; and

FIG. 8 is a process flow diagram of a fixed-abrasive polishing technique that may be used to polish the conductive material.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof are shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that the drawings and detailed description thereto are not intended to limit the invention to the particular form disclosed, but on the contrary, the intention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the appended claims.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Turning to FIG. 5, a partial cross-section of a semiconductor topography is presented. Electrically conductive features may be embodied within the topography. A dielectric layer 50 is shown which may comprise a dielectric material having a relatively low dielectric constant. Dielectric layer 50 may comprise, e.g., a glass- or silicate-based material, such as an oxide that has been deposited by chemical-vapor deposition ("CVD") from either a tetraethyl orthosilicate ("TEOS") source or a silane source and doped with an impurity, e.g., boron or phosphorus. Dielectric layer 50 may serve as a poly-metal interlevel dielectric ("PMD") between a doped polycrystalline silicon ("polysilicon") gate layer and an ensuing metal interconnect layer. It is to be understood that the gate layer may comprise other conductive materials besides polysilicon. Alternatively, dielectric 50 may form an

US 6,849,946 B2

7

inter-metal interlevel dielectric ("IMD") between an underlying metal interconnect layer and an ensuing overlying metal interconnect layer.

A plurality of dummy trenches **56** may be formed in dielectric layer **50** between a series of relatively narrow trenches **52** and a relatively wide trench **54**. While the dimensions of these trenches may vary depending on the design specifications, the dummy trenches **56** are preferably 1 to 5 microns in width, the narrow trenches **52** preferably have sub-micron widths, and the wide trench **54** is preferably greater than 50 microns in width. Also, the depths of all the trenches may range from 2,000 Å to 1 micron. Further, the set of relatively narrow trenches **52** may be spaced apart by a distance of less than 1 micron and from the relatively wide trench **54** by a distance greater than 50 microns. Although the spacing between dummy trenches **56** may vary, this spacing may, e.g., range from 0.5 micron to 50 micron. The trenches may be formed by lithographically patterning a photoresist layer upon dielectric layer **50** to expose select portions of the depicted dielectric. The select portion of dielectric layer **50** not covered by the patterned photoresist is then etched using an etch technique, e.g., a CF₄ plasma etch.

As shown in FIG. 6, a conductive material **58** may subsequently be deposited into the trenches and across dielectric layer **50** to a level spaced above the uppermost horizontal surface of dielectric layer **50**. Conductive material **58** may comprise a metal, e.g., aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof. Such a metal may be sputter deposited from a metal target or MOCVD (i.e., metal organic CVD) deposited from a metal organic source. The as-deposited conductive material **58** has an elevationally disparate surface that includes a first region **60** above narrow trenches **52**, a second region **62** above dummy trenches **56**, and a third region **64** above wide trench **54**. The valley areas of regions **60**, **62**, and **64** are directly above respective trenches, while the hill areas are directly above respective dielectric protrusions that are positioned between the trenches.

Turning to FIG. 7, conductive material **58** may then be polished to a level substantially coplanar with the uppermost surface of dielectric layer **50**. As a result of polishing conductive material **58**, relatively narrow interconnect **66** are formed exclusively in trenches **52**, dummy conductors **68** are formed in dummy trenches **56**, and a relatively wide interconnect **72** is formed in trench **54**. Dummy conductors **68** are laterally spaced from each other and/or from interconnect **66** and **72** by dummy dielectric protrusions **70**. Placing dummy conductors **68** in the region between the series of narrow interconnect **66** and the wide interconnect **72** affords global planarization of the topological surface. That is, the polish rate is substantially uniform across the entire topological surface. Also, the polish rate of elevationally raised regions is greater than that of elevationally recessed regions. Further, a surface having elevational disparity is polished at a faster rate than a substantially flat surface.

It is believed that the presence of dummy conductors **68** helps prevent the polishing pad from deforming about the length of the pad into relatively wide trench **54** when subjected to normal pressure. Further, it is postulated that placing dummy conductors **68** between dummy dielectric protrusions **70** ensures that elevational fluctuations are present in different regions of the topological surface at the same time. That is, no particular region of the topological surface becomes substantially planarized before other regions and thereby causes fluctuations in the polish rate

8

across the surface. Thus, the polish rate does not slow down until the entire topological surface is substantially free of elevational disparity.

Dummy conductors **68** are not connected to any active or passive device which forms an integrated circuit of the semiconductor topography shown in FIG. 7. While dummy conductors can carry power or ground voltages, they do not carry transitory voltages or current associated with an operable circuit. Nor are they associated or connected in any way with active circuit elements and/or features such as a contact, implant, gate, etc., of a transistor, capacitor, resistor, etc.

FIG. 8 illustrates a process flow diagram of a fixed abrasive CMP technique that may be used to polish conductive material **58**, and thereby form the substantially planar topography shown in FIG. 7. Conductive material **58** may be polished using an apparatus similar in some respects to that shown in FIG. 1. The apparatus in FIG. 1 may be purposefully modified to accommodate an abrasive polishing surface and a conduit for delivering a particle-free solution to the polishing surface. Alternatively, a conventional CMP process may be employed for polishing conductive material **58**. The CMP slurry may include a component that chemically reacts with conductive material **58**.

As described in block **72**, a particle-free liquid is dispensed onto an abrasive polishing surface of a polishing pad having a substantially rigid supportive backing. An appropriate polishing pad is commercially available from Minnesota Mining and Manufacturing Company. The polishing surface comprises a polymer-based matrix entrained with abrasive particles. Appropriate materials that may be used for the particles include, but are not limited to, ceria, α alumina, γ alumina, silicon dioxide, titania, chromia, and zirconia. Preferably, the polishing liquid forwarded onto the abrasive polishing surface is deionized water. The polishing liquid may also be other types of liquids which have a near-neutral pH. As shown in block **74** of FIG. 8, the semiconductor topography depicted in FIG. 6 may be positioned face-down upon the polishing surface. The polishing liquid is positioned at the interface between the semiconductor topography and the abrasive polishing surface.

As indicated by block **76** of FIG. 8, the semiconductor topography and the abrasive polishing surface may be rotated relative to each other while the frontside of the topography is forced against the polishing surface. It is believed that contact between the high elevation regions of conductive material **58** and the abrasive particles as well as the polishing liquid causes the surface material of conductive material **58** in those elevated regions to be released from bondage with the bulk of the conductive material. The particles extending from the abrasive polishing surface have a sufficient hardness to dislodge the reacted surface material during abrasion of the high elevation regions. The rigidity of the polishing pad may be sufficient to prevent the abrasive polishing surface from contacting recessed regions of conductive material **58**. Accordingly, very little of the conductive material **58** in the recessed regions is removed.

It will be appreciated to those skilled in the art having the benefit of this disclosure that this invention is believed to provide a method for forming a substantially planar semiconductor topography by placing a plurality of dummy conductors in a dielectric layer laterally between a relatively wide interconnect and a series of relatively narrow interconnect. Further modifications and alternative embodiments of various aspects of the invention will be apparent to those skilled in the art in view of this description. For example,

US 6,849,946 B2

9

electrically conductive features isolated from each other by a dielectric may subsequently be formed upon the planarized semiconductor topography. It is intended that the following claims be interpreted to embrace all such modifications and changes and, accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

What is claimed is:

1. A method, comprising:

etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches, wherein each of the second trenches is relatively narrow compared to the first trench;

filling said trenches with a conductive material; and

polishing said conductive material to form dummy conductors in said laterally spaced dummy trenches and interconnect in said series of second trenches and said first trench, wherein said polishing comprises applying a liquid substantially free of particulate matter between an abrasive polishing surface and the conductive material.

2. The method of claim 1, wherein said conductive material comprises a metal selected from the group consisting of aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof.

3. The method of claim 1, wherein said polishing said conductive material is performed at a substantially uniform polish rate above said laterally spaced dummy trenches and said series of relatively narrow second trenches and said first trench.

4. The method of claim 1, wherein said polishing results in dummy dielectric protrusions between adjacent pairs of said laterally spaced dummy trenches, said dummy dielectric protrusions having first upper surfaces substantially coplanar with second upper surfaces of said dummy conductors.

5. The method of claim 1, wherein said abrasive polishing surface comprises particles at least partially fixed into a polymer-based matrix, and wherein said particles comprise a material selected from the group consisting of cerium oxide, cerium dioxide, aluminum oxide, silicon dioxide, titanium oxide, chromium oxide, and zirconium oxide.

6. The method of claim 1, wherein said polishing comprises placing a CMP slurry onto a polishing pad surface, and contacting said polishing pad surface with an upper surface of said conductive material while rotating said polishing pad surface relative to said upper surface.

7. The method of claim 1, wherein said dummy conductors are substantially co-planar with said interconnect.

8. The method of claim 1, wherein said polishing comprising applying a liquid consisting essentially of deionized water at a substantially neutral pH.

9. A method comprising:

etching a plurality of laterally spaced dummy trenches into a dielectric layer between a trench which is to receive a first interconnect feature and a series of trenches which are to receive a series of second interconnect features, wherein the first interconnect feature is relatively wide compared to each of the series of second interconnect features;

filling said plurality of laterally spaced dummy trenches with a conductive material; and

polishing said conductive material to form dummy conductors, wherein said polishing comprises applying a liquid substantially free of particulate matter between an abrasive polishing surface and the conductive material.

10. The method of claim 9, wherein said conductive material comprises a metal selected from the group consist-

10

ing of aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof.

11. The method of claim 9, wherein said polishing said conductive material is performed at a substantially uniform polish rate above said laterally spaced dummy trenches and said trench and said series of trenches.

12. The method of claim 9, wherein said polishing results in dummy dielectric protrusion between adjacent pairs of said laterally spaced dummy trenches, said dummy dielectric protrusions having first upper surfaces substantially coplanar with second upper surfaces of said dummy conductors.

13. The method of claim 9, wherein said abrasive polishing surface comprises particles at least partially fixed into a polymer-based matrix, and wherein said particles comprise a material selected from the group consisting of cerium oxide, cerium dioxide, aluminum oxide, silicon dioxide, titanium oxide, chromium oxide, and zirconium oxide.

14. The method of claim 9, wherein said dummy conductors are substantially co-planar with said first interconnect feature and said series of second interconnect features.

15. The method of claim 9, wherein said polishing comprising applying a liquid consisting essentially of deionized water at a substantially neutral pH.

16. A substantially planar semiconductor topography, comprising:

a plurality of laterally spaced dummy trenches in a dielectric layer, between a first trench and a series of second trenches, wherein each of the second trenches is relatively narrow compared to the first trench and wherein a lateral dimension of at least one of the laterally spaced dummy trenches is less than a lateral dimension of the first trench and greater than a lateral dimension of at least one of the series of second trenches;

dummy conductors in said laterally spaced dummy trenches and electrically separate from electrically conductive features below said dummy conductors; and

conductive lines in said series of second trenches and said first trench, wherein upper surfaces of said conductive lines are substantially coplanar with dummy conductor upper surfaces.

17. The substantially planar semiconductor topography of claim 16, further comprising dummy dielectric protrusions between adjacent pairs of said laterally spaced dummy trenches, said dummy dielectric protrusions having dummy dielectric upper surfaces substantially coplanar with said dummy conductor upper surfaces.

18. The substantially planar semiconductor topography of claim 16, wherein said dummy conductors comprise a metal selected from the group consisting of aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof.

19. The substantially planar semiconductor topography of claim 16, wherein said conductive lines comprise a metal selected from the group consisting of aluminum, copper, tungsten, molybdenum, tantalum, titanium, and alloys thereof.

20. The substantially planar semiconductor topography of claim 16, wherein lateral dimensions of the laterally spaced dummy trenches are between approximately 1 micron and approximately 5 microns.

21. The substantially planar semiconductor topography of claim 16, wherein the lateral dimension of the first trench is greater than approximately 50 microns.

22. The substantially planar semiconductor topography of claim 16, wherein the series of the second trenches comprise sub-micron lateral dimensions.

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,849,946 B1
DATED : February 1, 2005
INVENTOR(S) : Sethuraman et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 9,

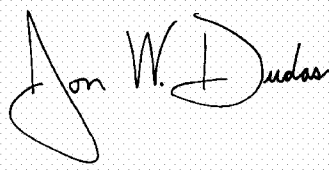
Line 28, delete "relatively narrow."

Column 10,

Lines 10-11 and 48, delete "conducts" and substitute -- conductors --.

Signed and Sealed this

Third Day of January, 2006

A handwritten signature in black ink on a light gray dotted background. The signature reads "Jon W. Dudas" in a cursive, stylized script. The "J" is large and loops around the "on". The "W" is written with two distinct peaks. The "Dudas" part is also cursive, with the "D" being particularly large and looping.

JON W. DUDAS

Director of the United States Patent and Trademark Office

EXHIBIT C



US007064005B2

(12) **United States Patent**
Takaoka

(10) **Patent No.:** **US 7,064,005 B2**
(45) **Date of Patent:** **Jun. 20, 2006**

(54) **SEMICONDUCTOR APPARATUS AND METHOD OF MANUFACTURING SAME**

(75) Inventor: **Yuji Takaoka**, Kanagawa (JP)

(73) Assignee: **Sony Corporation**, Tokyo (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/474,863**

(22) PCT Filed: **May 10, 2002**

(86) PCT No.: **PCT/JP02/04572**

§ 371 (c)(1),
(2), (4) Date: **Oct. 8, 2003**

(87) PCT Pub. No.: **WO02/101831**

PCT Pub. Date: **Dec. 19, 2002**

(65) **Prior Publication Data**

US 2004/0115919 A1 Jun. 17, 2004

(30) **Foreign Application Priority Data**

May 14, 2001 (JP) 2001-143045

(51) **Int. Cl.**

H01L 21/44 (2006.01)

H01L 21/48 (2006.01)

H01L 21/50 (2006.01)

H01L 21/30 (2006.01)

H01L 21/46 (2006.01)

(52) **U.S. Cl.** **438/108**; 438/617; 438/459;
438/977

(58) **Field of Classification Search** 438/459,
438/977, FOR. 485

See application file for complete search history.

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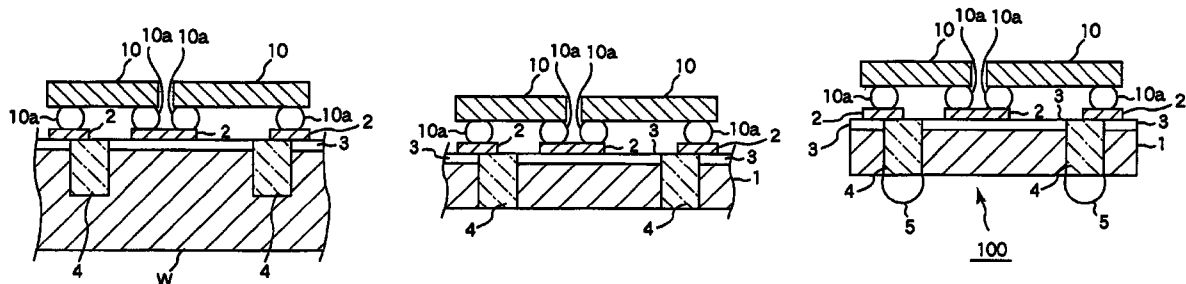
Primary Examiner—David E. Graybill

(74) *Attorney, Agent, or Firm*—Sonnenschein Nath & Rosenthal LLP

(57) **ABSTRACT**

A semiconductor apparatus that allow miniaturization of a multichip module using an interposer substrate and a method of manufacturing the same are provided. It is configured that an embedded electrode (4) penetrating through an interposer substrate (1) is provided, one end thereof is made to be connected to a connection electrode (2) on which device chips (10) are flip-chip mounted, and connecting to an unillustrated mounting substrate via a bump electrode (5), that is, because an electrode connecting the mounting substrate is made to be drawn out from the back surface of the interposer substrate (1), a multichip module can be miniaturized.

8 Claims, 5 Drawing Sheets



US 7,064,005 B2

Page 2

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U.S. Patent

Jun. 20, 2006

Sheet 1 of 5

US 7,064,005 B2

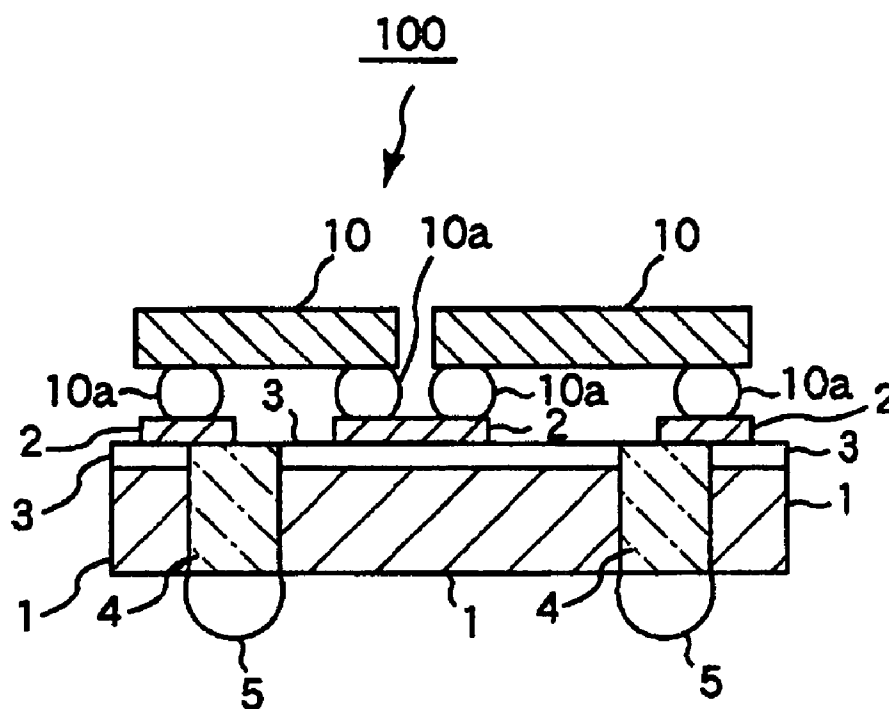


Fig.1

U.S. Patent

Jun. 20, 2006

Sheet 2 of 5

US 7,064,005 B2

Fig.2A

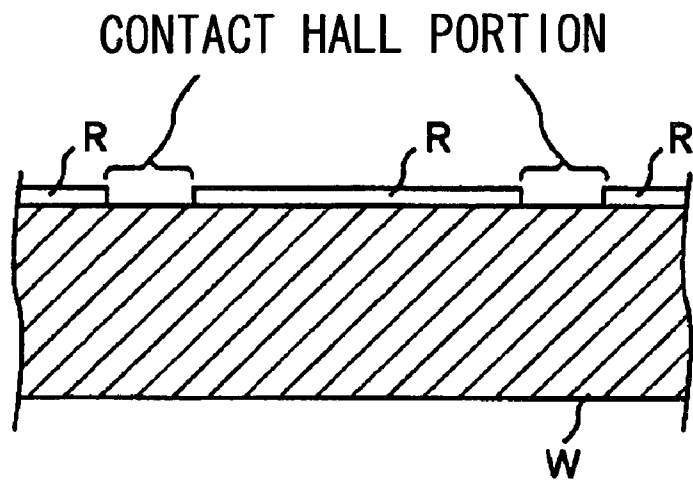
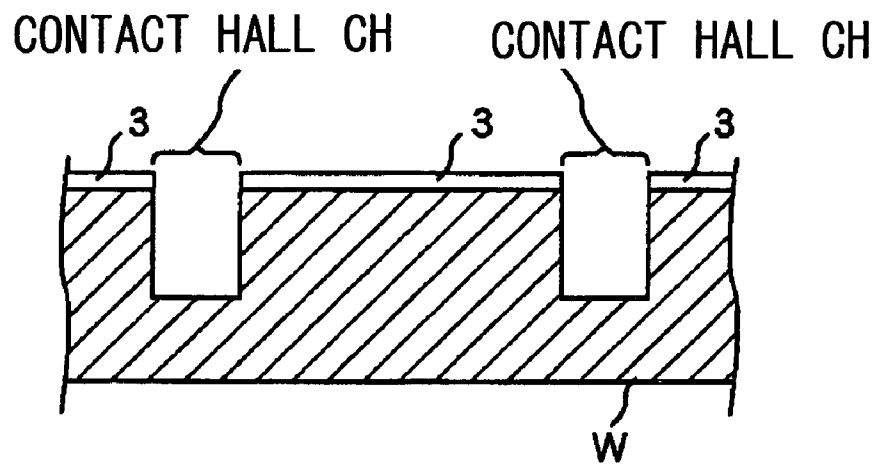


Fig.2B



U.S. Patent

Jun. 20, 2006

Sheet 3 of 5

US 7,064,005 B2

Fig.3A

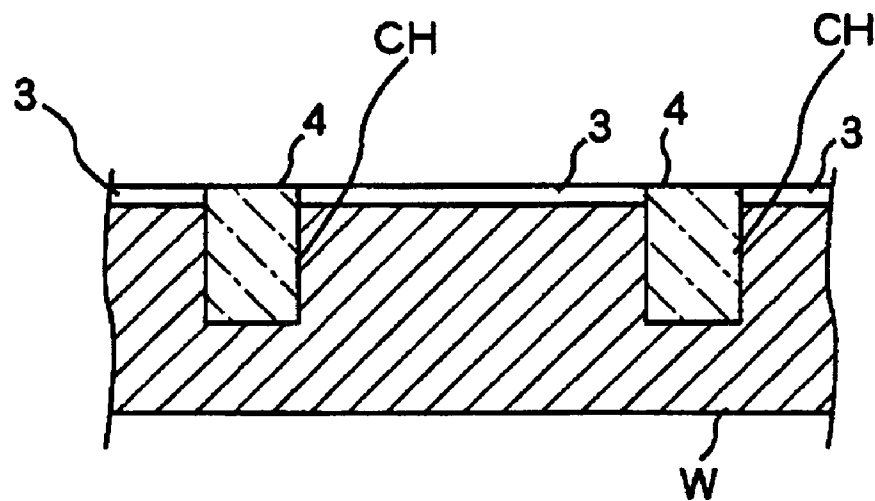
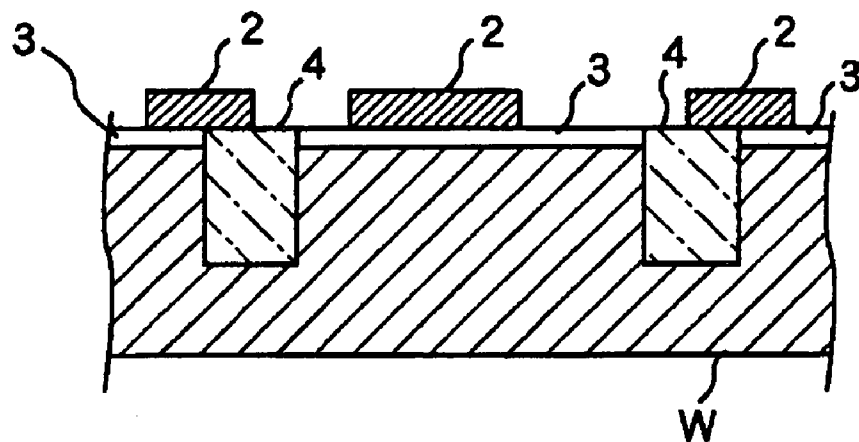


Fig.3B



U.S. Patent

Jun. 20, 2006

Sheet 4 of 5

US 7,064,005 B2

Fig.4A

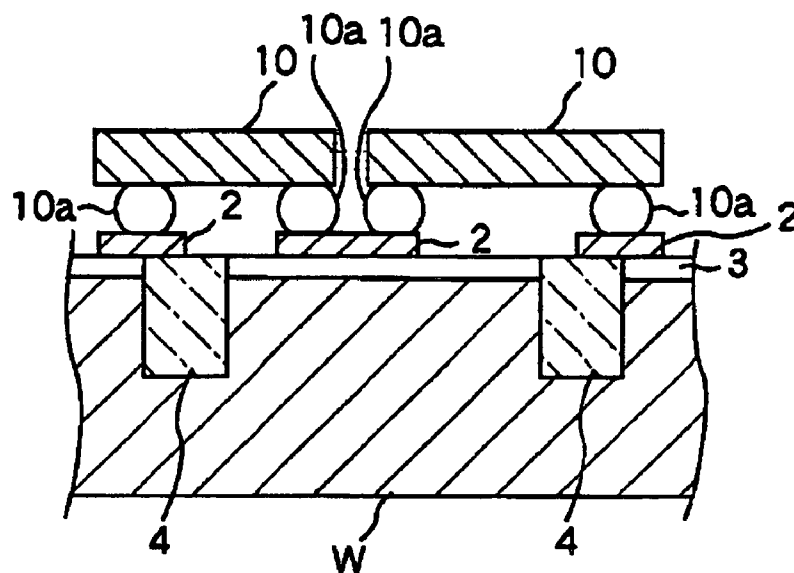


Fig.4B

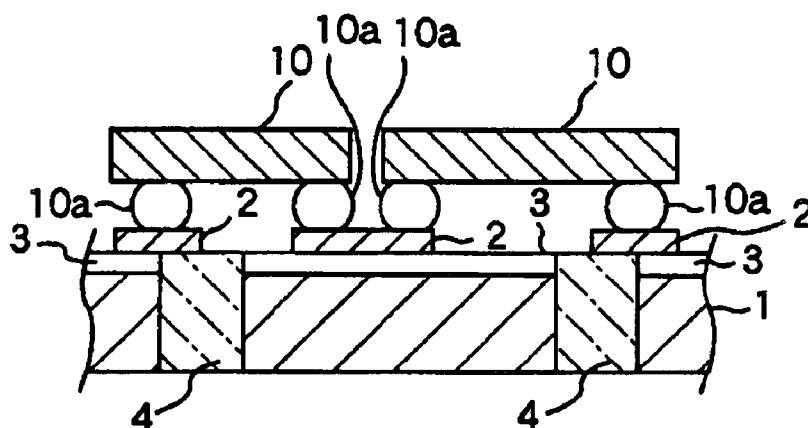
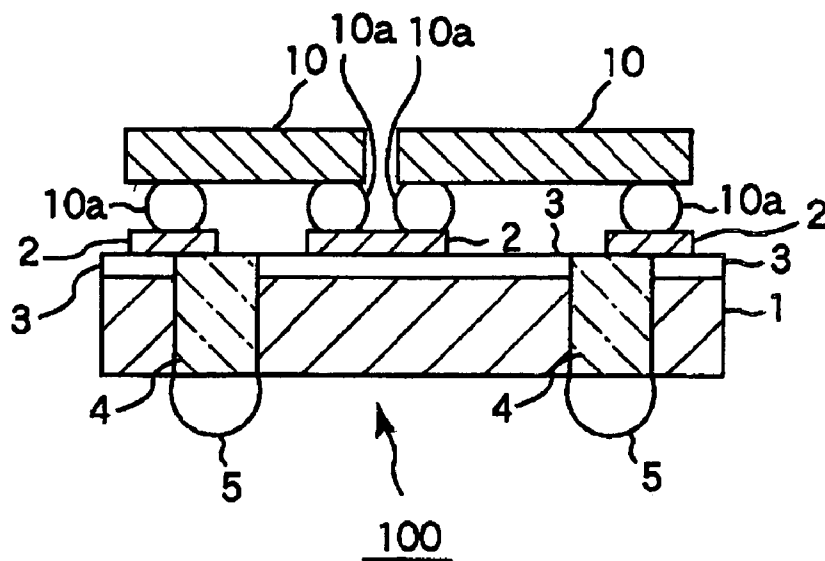


Fig.4C



U.S. Patent

Jun. 20, 2006

Sheet 5 of 5

US 7,064,005 B2

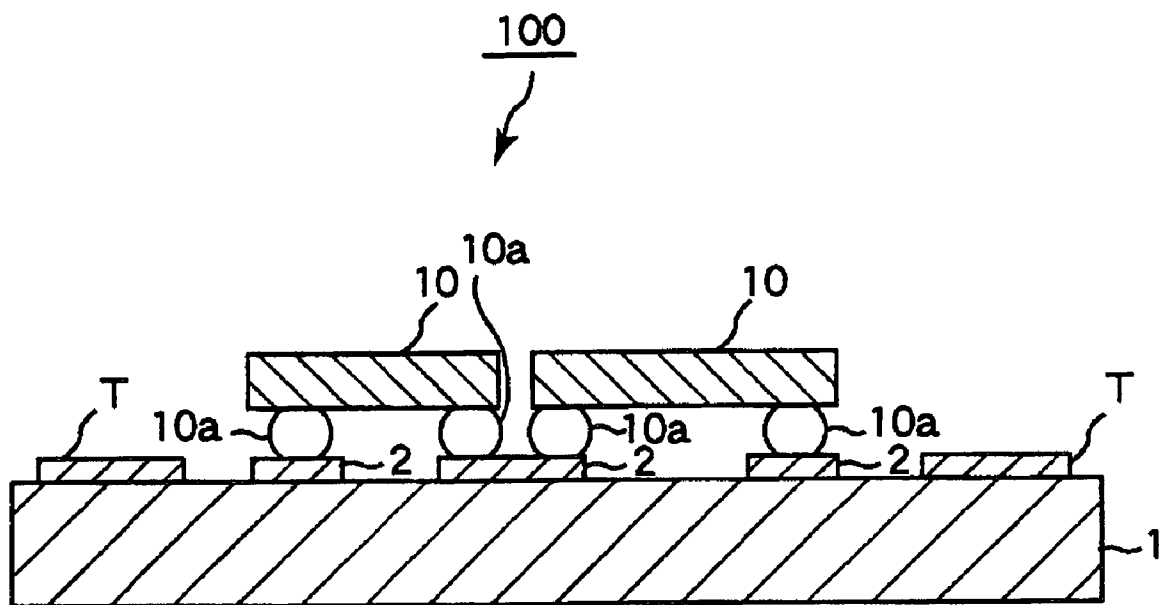


Fig.5

US 7,064,005 B2

1

SEMICONDUCTOR APPARATUS AND METHOD OF MANUFACTURING SAME

The present invention relates to a semiconductor apparatus suitable for a multichip module and a method of manufacturing the same.

In recent years, technologies are known such as mounting a plurality of device chips of CSP (Chip Size Package) structure on a substrate, constituting a semiconductor apparatus called as a multichip module in which a plurality of device chips are flip-chip mounted on an interposer substrate. The technology of flip-chip mounting of device chips on an interposer substrate is disclosed in, for example, Patent Publication No. 2000-164635.

By the way, in a semiconductor apparatus **100** constituting a multichip module by use of an interposer substrate, as shown in a sectional view of FIG. **5**, it is configured in such a way that each device chips **10** and bumps **10a** formed on **10** are connected to connection electrodes **2** on an interposer substrate **1**. In such a connection configuration, wiring between each device chips are possible to be miniaturized, however, connection terminals **T** formed at peripheral parts of the interposer substrate **1** are used to connect the semiconductor apparatus **100** to an unillustrated mounting substrate.

For this reason, as the number of the connection terminals **T** increases on the interposer substrate **1**, the area of the interposer substrate needs to be expanded in order to provide the connection terminals thereon, and it becomes a factor that blocks miniaturization of the multichip module.

Consequently, the present invention is directed in view of such circumstances, and an object thereof is to provide a semiconductor apparatus which can miniaturize a multichip module with the use of an interposer substrate and a method of manufacturing the same.

SUMMARY OF THE INVENTION

In order to achieve the above mentioned object, in the present invention, there is provided a semiconductor apparatus constituting a multichip module by flip-chip mounting a plurality of device chips on an interposer substrate characterized by: providing an embedded electrode penetrating through the interposer substrate; connecting one end thereof to a connection electrode on which the device chips are flip-chip mounted; and forming a bump electrode at the other end thereof.

Further, in the present invention, there is provided a method of manufacturing a semiconductor apparatus constituting a multichip module by flip-chip mounting a plurality of device chips on an interposer substrate characterized by including: a first step for forming an embedded electrode by filling a contact hole penetrating through a wafer, which is a base material of the interposer substrate, with conductor; a second step for forming wiring including a connection electrode connected to the one end of the embedded electrode and a connection electrode on which the device chips are flip-chip mounted on a surface of the wafer; a third step for forming the interposer substrate by grinding and polishing a back surface of the wafer until the other end of the embedded electrode is exposed, after the plurality of device chips are flip-chip mounted on the connection electrode formed in the second step; and a forth step for providing a bump electrode on the other end of the embedded electrode exposed in the third step.

In the present invention, it is configured that an embedded electrode penetrating through an interposer substrate is

2

provided, and one end thereof is made to be connected to a connection electrode on which the device chips are flip-chip mounted, and then a bump electrode at the other end thereof is formed, so that an electrode connecting to a mounting substrate can be drawn out from the back surface of the interposer substrate. Therefore, it is possible to miniaturize a multichip module.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a sectional view showing configuration of a semiconductor apparatus **100** in the present embodiment.

FIGS. **2A** to **2B** are diagrams explaining manufacturing process of the semiconductor apparatus **100**.

FIGS. **3A** to **3B** are diagrams explaining manufacturing process of the semiconductor apparatus **100**.

FIGS. **4A** to **4C** are diagrams explaining manufacturing process of the semiconductor apparatus **100**.

FIG. **5** is a diagram explaining a conventional embodiment.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

Hereinafter, one embodiment of the present invention will be described with reference to drawings. FIG. **1** is a sectional view showing a configuration of a semiconductor apparatus **100** in accordance with the embodiment. In this diagram, the same numerals are given for the common parts in the conventional embodiment described previously (refer to FIG. **5**), and the explanations about them are omitted.

With respect to the difference between the semiconductor apparatus **100** showing FIG. **1** and the conventional embodiment in FIG. **5** is the configuration in which an embedded electrode **4** penetrating through an interposer substrate **1** is provided, one end thereof is made to be connected to connection electrodes **2** on which device chips **10** are flip-chip mounted, and connected to an unillustrated mounting substrate via a bump electrodes **5** at the other end thereof. According to such a configuration, connection terminals **T** formed at peripheral parts of the interposer substrate **1** are unnecessary, so that the multichip module can be miniaturized.

Next, with reference to FIG. **2A** to FIG. **2B**, FIG. **3A** to FIG. **3B** and FIG. **4A** to FIG. **4C**, manufacturing processes of the semiconductor apparatus **100** configured as mentioned above will be described. In the manufacturing processes of the present embodiment, at first, as shown in FIG. **2A**, on a surface of a wafer **W** made of, for example, a silicon substrate which is a base material of an interposer substrate **1**, and a resist **R** is patterned to make openings so as to correspond to contact holes **CH** described later. Next, etching process is performed on the wafer **W** with the resist **R** as a mask. The contact holes **CH** of 50 to 100 μm depth are formed in a way shown in FIG. **2B**. After the contact holes **CH** are formed, the resist **R** is removed and an oxide film **3** of 3 to 4 μm film thickness is formed on the surface of the wafer **W**.

Next, as shown in FIG. **3**, an electroless plating method, for example, is used to form an embedded electrode **4** by filling good conductors such as copper, gold or an alloy of those into the contact holes **CH**. After the embedded electrodes **4** are formed in this manner, a plurality of connection electrodes **2** are formed on the oxide film **3** or on the embedded electrodes **4** (refer to FIG. **3B**). After this, as shown in FIG. **4A**, the flip-chip mounting is carried out in

US 7,064,005 B2

3

order to connect the connection electrodes **2** formed on the wafer **W** to the each device chips **10** and to bumps **10a** of **10**.

After the flip-chip mounting is carried out, as shown in FIG. 4B, a back surface of wafer **W** is grinded and polished by backgrinding until bottoms of the electrodes **4** are exposed, and the thin filmed interposer substrate **1** is formed in this way. As shown in FIG. 4C, after bump electrodes **5** are provided at the end of the embedded electrodes **4** exposed at the back surface of the interposer substrate **1**, the semiconductor apparatus **100** of the multichip module is formed as shown in FIG. 1 by dicing the interposer substrate **1** into small pieces.

As described above, according to the present invention, it is possible to configure in such a way that the embedded electrode is provided, and the one side thereof is made to be connected to the connection electrode on which the device chips are flip-chip mounted, and then connected to an unillustrated mounting substrate via bumps **5** at the other side thereof, that is, the electrodes connecting to the mounting substrate can be drawn out from the back surface of the interposer substrate **1**, so that the multichip module can be miniaturized.

According to the present invention, it is possible to configure in such a way that the embedded electrode penetrating through the interposer substrate is provided, and the one side thereof is made to be connected to the connection electrode on which device chips are flip-chip mounted, and then the bump electrode is formed at the other end thereof, so that the electrode connecting to the mounting substrate can be drawn out from the back surface of the interposer substrate, therefore, the multichip module can be miniaturized.

Further, according to the present invention, after the embedded electrode is formed by filling the contact hole penetrating through the wafer, which is the base material of the interposer substrate, with the conductor, the interposer substrate is formed by grinding and polishing the back surface of the wafer until the other end of the electrode is exposed, so that the electrode connecting to the mounting substrate from the back surface of the interposer is formed easily, and it can be contributed for the cost reduction.

The invention claimed is:

1. A method of manufacturing a semiconductor apparatus constituting a multichip module wherein a plurality of device chips are flip-chip mounted on an interposer substrate, characterized by comprising:

a first step for forming an embedded electrode by filling a contact hall penetrating through a wafer with conductor, said wafer being a base material of said interposer substrate;

a second step for forming wiring including a connection electrode connected to a first end of the embedded electrode and a connection electrode on which said device chips to be flip-chip mounted on a surface of said wafer;

4

a third step for forming said interposer substrate by grinding and polishing a back surface of said wafer until a second end of said embedded electrode is exposed after said plurality of device chips are flip-chip mounted on said connection electrode formed in the second step; and

a fourth step for providing a bump electrode on the second end of said embedded electrode exposed in the third step.

2. A method for manufacturing a semiconductor apparatus according to claim 1, characterized in that said interposer substrate comprises a silicon substrate.

3. A method for manufacturing a semiconductor apparatus according to claim 1 wherein after performing the third step, the second end of said embedded electrode does not protrude past the back surface of the wafer.

4. A method for manufacturing a semiconductor apparatus according to claim 1 wherein after performing the third step, the second end of said embedded electrode is substantially even with the back surface of the wafer.

5. A method of manufacturing a semiconductor apparatus constituting a multichip module wherein a plurality of device chips are flip-chip mounted on an interposer substrate, characterized by comprising:

a first step for forming an embedded electrode by filling a contact hall penetrating through a wafer with conductor, said wafer being a base material of said interposer substrate;

a second step for forming wiring including a connection electrode connected to a first end of the embedded electrode, whereby a device chip can be flip-chip mounted to the connection electrode;

a third step for forming said interposer substrate by grinding and polishing a back surface of said wafer until a second end of said embedded electrode is exposed; and

a fourth step for providing a bump electrode on the second end of said embedded electrode exposed in the third step.

6. A method for manufacturing a semiconductor apparatus according to claim 5, characterized in that said interposer substrate comprises a silicon substrate.

7. A method for manufacturing a semiconductor apparatus according to claim 5 wherein after performing the third step, the second end of said embedded electrode does not protrude past the back surface of the wafer.

8. A method for manufacturing a semiconductor apparatus according to claim 5 wherein after performing the third step, the second end of said embedded electrode is substantially even with the back surface of the wafer.

* * * * *

EXHIBIT D



US006317333B1

(12) **United States Patent**
Baba

(10) **Patent No.:** **US 6,317,333 B1**
(45) **Date of Patent:** **Nov. 13, 2001**

(54) **PACKAGE CONSTRUCTION OF SEMICONDUCTOR DEVICE**

(75) Inventor: **Shinji Baba, Tokyo (JP)**

(73) Assignee: **Mitsubishi Denki Kabushiki Kaisha, Tokyo (JP)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/427,583**

(22) Filed: **Oct. 27, 1999**

Related U.S. Application Data

(63) Continuation-in-part of application No. 09/061,022, filed on Apr. 16, 1998, now abandoned.

Foreign Application Priority Data

Aug. 28, 1997 (JP) 9-231927

(51) Int. Cl.⁷ **H05K 1/03**

(52) U.S. Cl. **361/795; 361/719; 361/767; 361/768; 361/792; 174/255; 257/691; 257/700; 257/701; 257/702; 257/786**

(58) Field of Search 361/719, 767, 361/768, 792, 794, 795; 174/255, 260; 257/691, 700, 701, 702, 704, 707, 723, 737, 738, 778, 786

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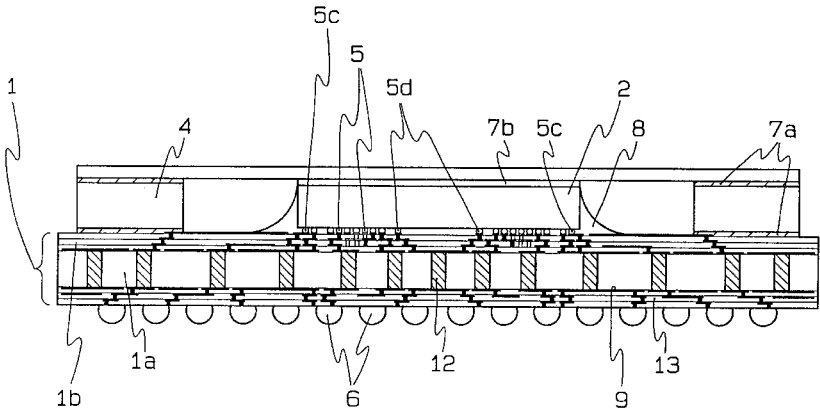
Primary Examiner—Jeffrey Gaffin
Assistant Examiner—John B. Vigushin

(74) Attorney, Agent, or Firm—Leydig, Voit & Mayer, Ltd.

(57) **ABSTRACT**

A semiconductor device includes a ball grid array substrate including an upper insulating layer of laminated insulating layers, an intermediate insulating layer, and a lower insulating layer of laminated insulating layers; lines on each top surface of the insulating layers included in the upper insulating layer, the intermediate insulating layer, and the lower insulating layer, respectively; and a semiconductor chip having electrodes connected to the lines, the semiconductor chip being connected with solder balls through via holes in each of the insulating layers, the solder balls being located on an outermost surface of the lower insulating layer.

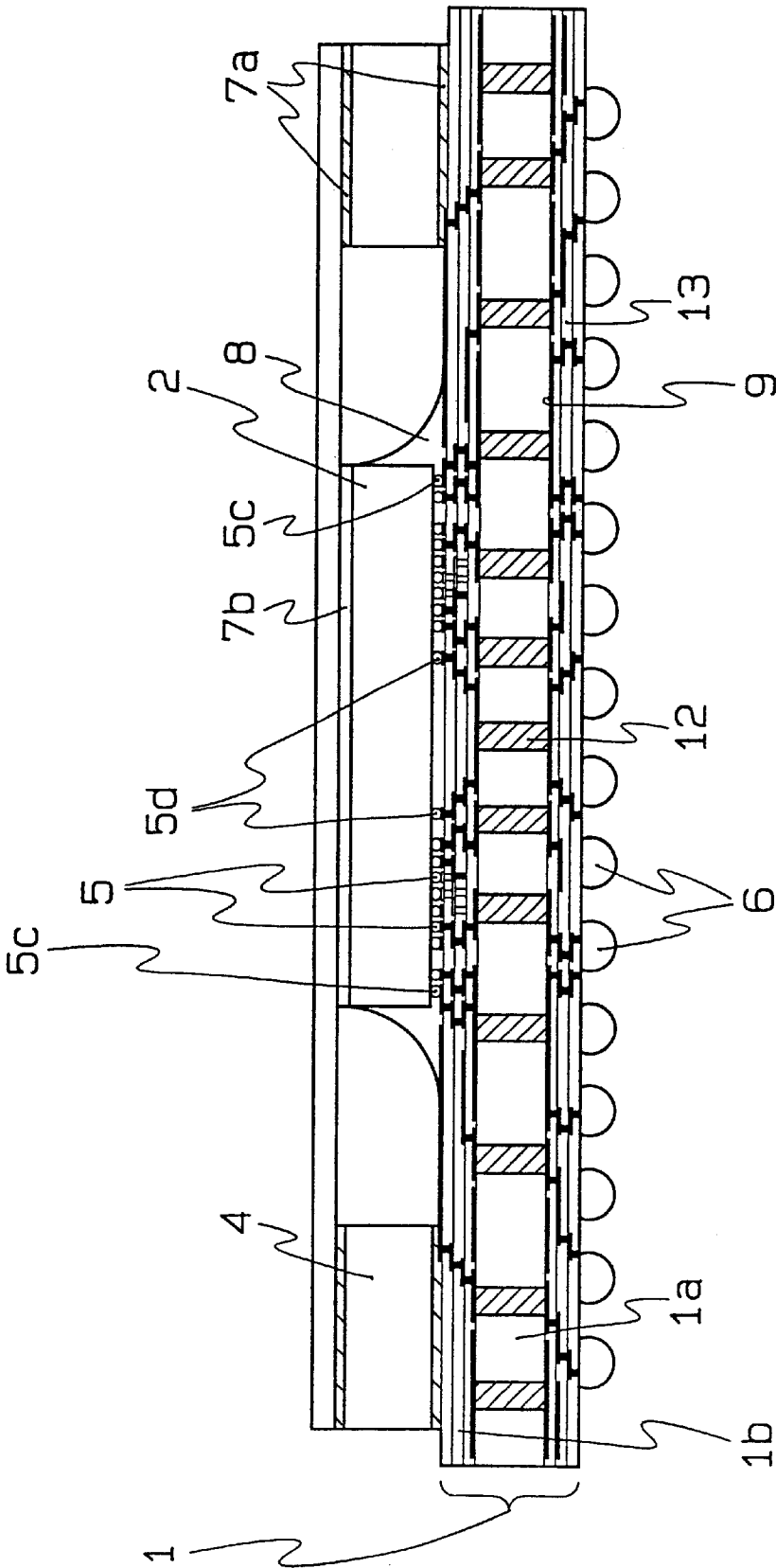
5 Claims, 5 Drawing Sheets

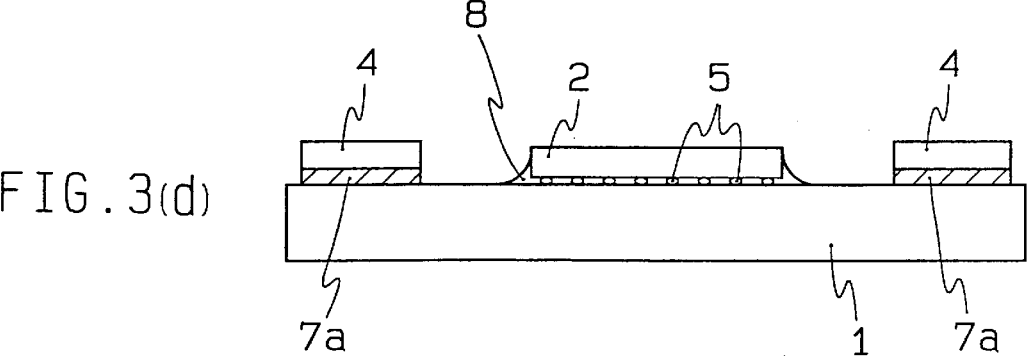
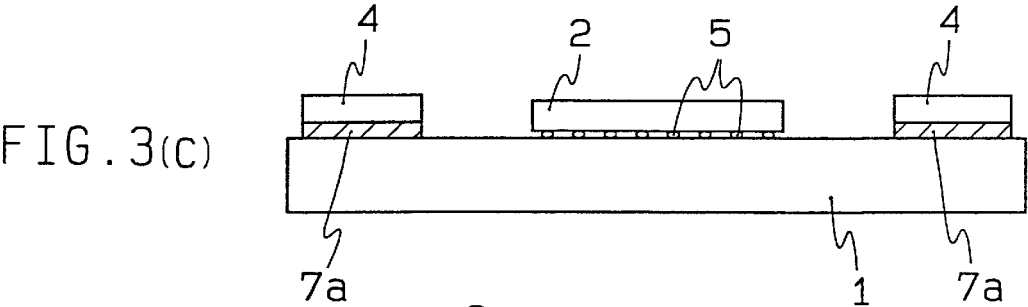
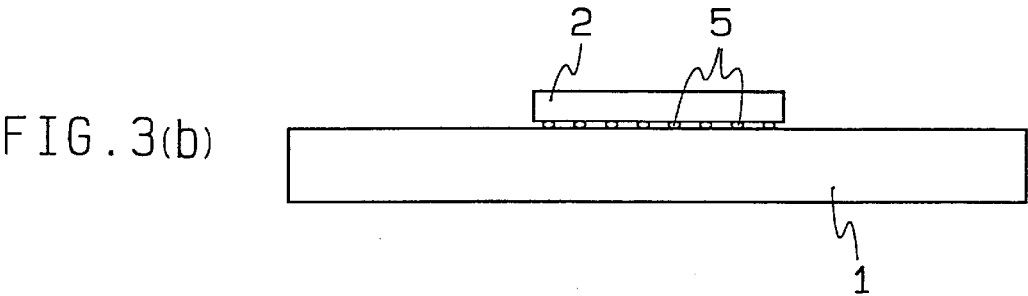
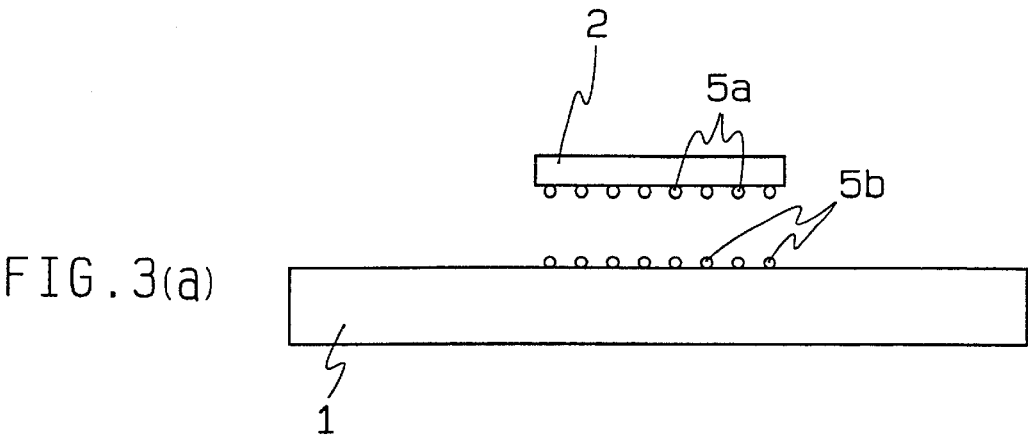


US 6,317,333 B1
Page 2

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FIG. 2





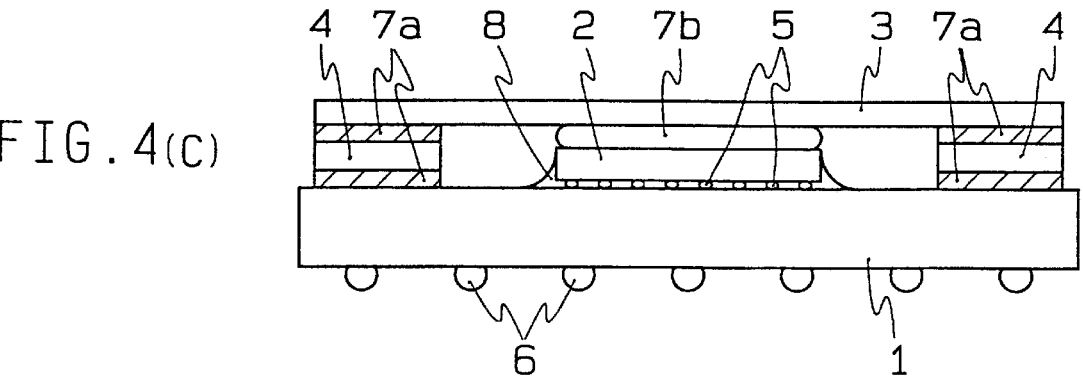
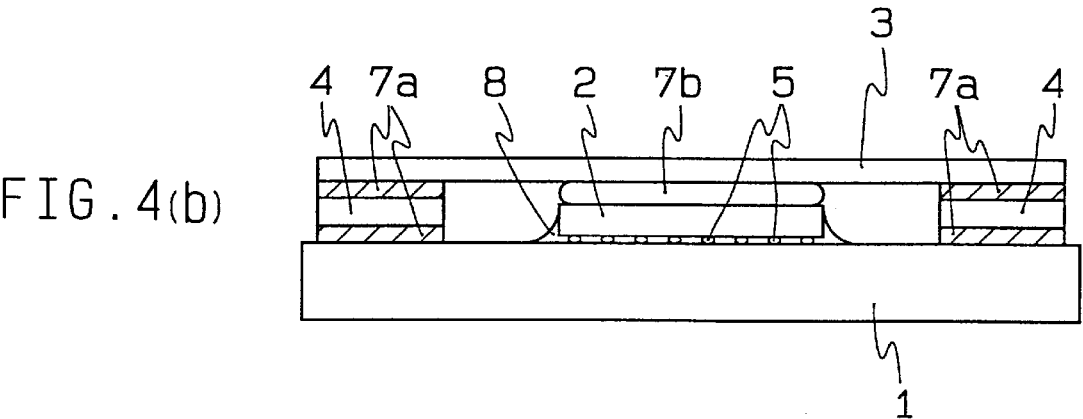
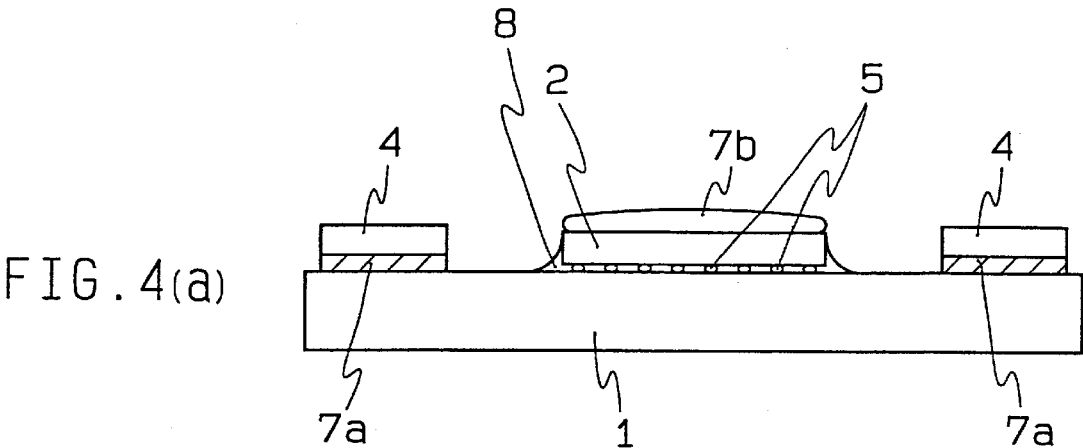
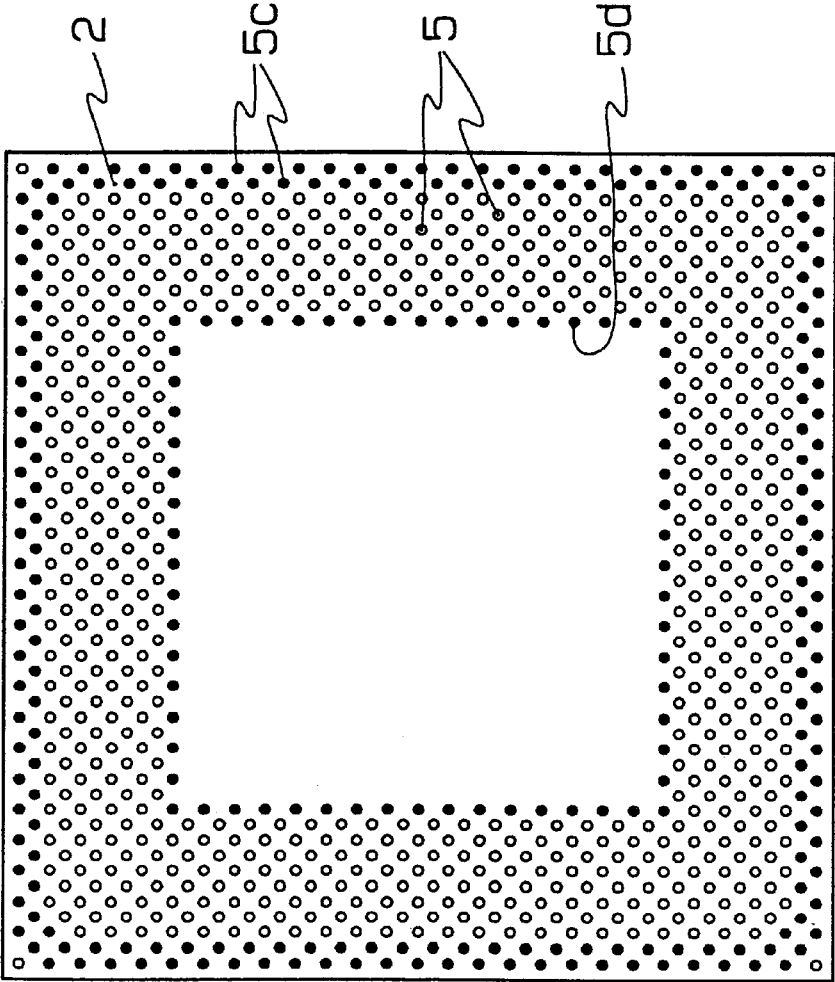


FIG. 5



**PACKAGE CONSTRUCTION OF
SEMICONDUCTOR DEVICE**

**CROSS-REFERENCE TO RELATED
APPLICATIONS**

This is a continuation-in-part of application Ser. No. 09/061,022 filed on Apr. 16, 1998, now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates to a package construction of semiconductor device, and more particularly to a package construction of semiconductor device having a BGA (Ball Grid Array) construction wherein solder balls used for soldering when mounting the semiconductor device are arranged on the rear surface of the substrate in the form of matrix.

In general, as disclosed in, for example, Japanese Unexamined Patent Publication No. 330474/1996, plastic packages, metal packages, and ceramic packages are used for packaging a semiconductor element. Among these packages, the ceramic package is used for packaging of CMOS gate arrays, ECL gate arrays, etc. because of its insulating and heat radiation capabilities as well as its moisture resistance.

For example, in Japanese Unexamined Patent Publication No. 8359/1996, there is disclosed BGA package which has been used as one type of surface mounting type package of plastic packages. The BGA package is manufactured by arranging solder bumps in the form of a matrix on the surface on the semiconductor chip side of the substrate on which the semiconductor chip is arranged, arranging spherical solder balls in the form of a matrix on the surface opposite to the semiconductor chip, arranging the semiconductor chip on the substrate surface, and sealing with resin or potting. In particular, the BGA package is used as a multi-pin package having more than 200 pins. Now, the construction in which solder balls serving as external electrodes are arranged in the form of a matrix on the rear surface of the substrate is called the BGA construction. Packaging the semiconductor device by this BGA construction is called BGA package, and the substrate with insulating layers laminated to form the BGA construction is called the BGA substrate.

In the case of this BGA package, organic material (or organic material containing non-organic material) hereinafter referred to as "organic material", might be used for the substrate material, but when this BGA package semiconductor device is mounted on a substrate surface, the difference in thermal expansion among the semiconductor chip, BGA substrate, and substrate mounted with a semiconductor device (hereinafter called the "circuit board") creates a problem.

The solder balls serving as external electrodes are provided on the surface opposite to the semiconductor chip of the BGA substrate and solder bumps are provided on the surface on the semiconductor chip side. The thermal expansion coefficient of the BGA substrate is greater on the outermost circumferential side, and stress generated by the thermal expansion is the greatest there. For this reason, there arises a problem that disconnection of solder bump for joining the semiconductor chip occurs or the semiconductor chip itself peels off.

If the BGA substrate is made of ceramic material, fine line design is possible with respect to interlayer connection lines by integral sintering, and signal lines in the substrate can be

optionally designed. However, in the case of an organic material, there is employed a buildup manufacturing method in which an insulating layer must first be formed, signal lines are wired to this insulating layer, via holes for interlayer connections are formed in the insulating layer, the next layer is formed on this top layer, and the signal lines and via holes are provided. Therefore, there are many restrictions in line design, and the material of BGA construction and signal line capable of solving the thermal expansion problems have not yet been obtained.

An object of the present invention is to provide a semiconductor device of the BGA construction with a high reliability, free of solder bump disconnection and removal of a semiconductor chip even when thermal stress is generated by thermal expansion.

SUMMARY OF THE INVENTION

A semiconductor device according to the present invention comprises a BGA substrate composed of an upper insulating layer in which a plurality of insulating layers are laminated, an intermediate insulating layer, and a lower insulating layer in which a plurality of insulating layers are laminated;

a plurality of lines provided on each top surface of the insulating layers included in the upper insulating layer, the intermediate insulating layer, and the lower insulating layer, respectively;

a plurality of solder balls provided on the outermost surface of the lower insulating layer; and

a semiconductor chip having a plurality of electrodes to be connected to the plurality of lines respectively, the semiconductor chip being connected electrically with the plurality of solder balls through a plurality of via holes provided in each of the insulating layers,

wherein a material for the insulating layers comprises an organic material which fits thermal expansion characteristics of a circuit board on which the semiconductor device is mounted.

In a semiconductor device of this invention having the thermal expansion characteristics of the circuit board expressed by the coefficient of linear expansion, wherein the difference of linear thermal expansion coefficient between the intermediate layer of the BGA substrate and the circuit board is within $1 \times 10^{-5}/^{\circ}\text{C}.$, and the difference of linear thermal expansion coefficients among the materials within the BGA substrate is within $1 \times 10^{-4}/^{\circ}\text{C}.$

A semiconductor device according to the invention contains at least one of the epoxy resin and tetrafluoroethylene resin for the organic material.

A semiconductor device of this invention comprises a BGA substrate composed of an upper insulating layer in which a plurality of insulating layers are laminated, an intermediate insulating layer, and a lower insulating layer in which a plurality of insulating layers are laminated;

a plurality of lines provided on top surfaces of the insulating layers included in the upper insulating layer, the intermediate insulating layer, and the lower insulating layer, respectively;

a plurality of solder balls provided on the outermost surface of the lower insulating layer; and

a semiconductor chip having a plurality of electrodes to be connected to the plurality of lines respectively, the semiconductor chip being connected electrically with the plurality of solder balls through a plurality of via holes provided in each of the insulating layers,

wherein the plurality of electrodes are provided in a peripheral region of the semiconductor chip, and the power supply and ground are connected to electrodes on outermost circumferential rows and innermost circumferential rows, respectively.

A semiconductor device according to this invention comprises a BGA substrate composed of an upper insulating layer in which a plurality of insulating layers are laminated, an intermediate insulating layer, and a lower insulating layer in which a plurality of insulating layers are laminated;

a plurality of lines provided on top surfaces of the insulating layers included in the upper insulating layer, the intermediate insulating layer, and the lower insulating layer respectively;

a plurality of solder balls provided on the outermost surface of the lower insulating layer; and

a semiconductor chip having a plurality of electrodes to be connected to the plurality of lines respectively,

wherein the semiconductor chip is connected electrically with the plurality of solder balls through a plurality of via holes provided in each of the insulating layers; the semiconductor device further including a sealing member comprising sealing resin to bring the semiconductor chip in close contact with the BGA substrate, a heat spreader for discharging heat generated in the semiconductor chips to the outside, a ring providing a specified clearance between the BGA substrate and the heat spreader as well as joining them, wherein a material for the insulating layers comprises organic material which fits to the thermal expansion characteristics of a circuit board on which the semiconductor device is mounted.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially cutaway view in perspective of one embodiment of the semiconductor device according to this invention;

FIG. 2 is a sectional view showing one embodiment of the semiconductor device according to this invention;

FIGS. 3(a)–3(d) are sectional views of one example of a manufacturing process of the semiconductor device according to this invention;

FIGS. 4(a)–4(c) are sectional views of one example of a manufacturing process of the semiconductor device according to this invention; and

FIG. 5 is a plan view showing solder bumps on a semiconductor chip surface in the form of peripheral rows.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, description will be made on the embodiment of the construction of the semiconductor device according to the present invention.
Embodiment 1

Referring now to drawings, there is shown one preferred embodiment of the semiconductor device according to this invention.

The semiconductor device of the present invention comprises a BGA substrate, semiconductor chip arranged on the BGA substrate, a heat spreader discharging heat generated in the semiconductor chip to the outside, a ring for providing a specified clearance between the BGA substrate and the heat spreader as well as joining them. The BGA substrate has a multi-layer construction in which a plurality of insulating layers are superimposed, and including in each of the insulating layers a plurality of lines and via holes. The BGA

substrate has specified lines connected to one another through via holes when a plurality of insulating layers are superimposed, and it is possible for a plurality of lines to three-dimensionally cross one another via the insulating layers, and downsizing of the semiconductor device can be achieved.

FIG. 1 is a partially cutaway view in perspective of one embodiment of the semiconductor device according to this invention, while FIG. 2 is a view illustrating a cross-section taken along line II–II in FIG. 1. In FIG. 1, numeral 1 designates a BGA substrate, numeral 2 a semiconductor chip, numeral 3 a heat spreader, numeral 4 a ring (frame), numeral 6 a solder ball, and numeral 8 a sealing member. In FIG. 2, same reference numerals designate the same parts or corresponding parts in FIG. 1. In addition, in FIG. 2, numeral 5 designates a solder bump, numeral 5c a solder bump on the outermost circumferential row (hereinafter, simply called the “outermost circumferential solder bump”), numeral 5d a solder bump on the innermost circumferential row (hereinafter, simply called the “innermost circumferential solder bump”), numeral 7a the first adhesive layer, numeral 7b the second adhesive layer, numeral 9 line, numeral 12 a via, and numeral 13 an insulating layer. The first adhesive layer 7a affixes BGA substrate 1 to the ring 4, as well as the heat spreader 3 to the ring 4, respectively. The second adhesive layer 7b affixes the semiconductor chip 2 to the heat spreader 3.

Each of the lines (not illustrated) provided in the BGA substrate 1 is electrically connected to the external electrodes (not illustrated) of the semiconductor device. The solder ball 6 comprises a soldering material and is to be electrically connected to the external electrode of the semiconductor device. A plurality of electrodes (not illustrated) of the semiconductor chip 2 are electrically connected to the specified line of the BGA substrate 1, respectively. The relevant connection is achieved by providing solder bumps in advance on each electrode surface of the semiconductor chip 2 and the electrode surface connected to each line of the BGA substrate 1, and by soldering using the relevant solder bumps. The sealing member 8 comprises sealing resin, and is provided to bring the semiconductor chip 2 in close contact with the BGA substrate 1.

The ring 4 has an opening provided at the center of the sheet-form member. The profile of the opening is decided in accordance with the profile of the semiconductor chip 2. The heat spreader 3 has a profile similar to that of the BGA substrate 1 and has a thin sheet form. The semiconductor chip 2 and heat spreader 3, the BGA substrate 1 and ring 4, and the heat spreader 3 and ring 4 are affixed using an adhesive. For the adhesive to affix the semiconductor chip 2 and the heat spreader 3, an epoxy adhesive which provides good heat resistance and good advantage in cost is employed. On the other hand, for the adhesive to affix the BGA substrate 1 and the ring 4, and the heat spreader 3 and the ring 4, a silicone adhesive which has small Young’s modulus (E) is used for alleviating stress to the semiconductor chip 2.

The solder bumps 5 are arranged in a peripheral region of the semiconductor chip surface, excluding a center portion of the semiconductor chip surface, in the form of a matrix or in a staggered arrangement. The solder bump 5 joins an external electrode of the semiconductor chip 2 to an electrode on the surface side of the BGA substrate 1, and a solder ball 6 joins the external electrode on the rear surface side of the BGA substrate 1 to a circuit board. In this way, a construction in which input of the power supply or input and output of signals takes place is achieved between the semi-

conductor chip and the circuit board via line 9 and the via hole 12. Thus, the semiconductor chip is connected with the plurality of solder balls through a plurality of via holes for electrically connecting a plurality of lines provided on the top surface of the insulating layers.

The BGA substrate 1 comprises upper and lower insulating layers in each of which a plurality of insulating layers are laminated (built-up layer) and an intermediate insulating layer which serves as a rigid core. A plurality of electric wiring lines are provided on each surface of the insulating layers included in the upper, lower and intermediate insulating layers respectively, and a plurality of via holes are provided through each insulating layers for interlayer connection among electric wiring lines.

The BGA substrate 1 of the semiconductor device according to the present invention comprises organic material that matches thermal expansion characteristics of the circuit board in order to solve the problem arising from the thermal expansion. The thermal expansion characteristics are expressed as a coefficient of linear expansion in this specification.

With respect to the thermal expansion, for example, FR4 (glass cloth base material epoxy resin specified in ASTM D-1867 Specification) or BT resin (trade name; resin available from Mitsubishi Gas Chemical Co., Inc.) is used for the material of the circuit board, and their coefficients of linear expansion range from 1×10^{-5} to 2×10^{-5} /°C. According to the structure of the BGA substrate 1 as mentioned above, thermal expansion of the overall BGA substrate is most dependent on the intermediate insulating layer serving as a core, because of its dominant stiffness compared with those of the upper and lower laminated insulating layers.

Consequently, from the viewpoint of mounting reliability, coefficient of linear thermal expansion of the material used for the intermediate insulating layer (core) of the BGA substrate should be as close as possible to that of the material used for the circuit board. The best way to realizing the above is to use the same material for the core as that for the circuit board. Even if it is not the case, the difference of the linear thermal expansion coefficient between the two materials is preferable to be within 1×10^{-5} /°C.

The thermal expansion of the upper and lower laminated insulating layers causes another problem which is interlayer peeling between different insulating layers within the BGA substrate. From this viewpoint, similarly, a small difference of the linear thermal expansion coefficient among the materials used within the BGA substrate is preferable, but it is not so strict as compared with the former case. A tolerable amount of the difference of thermal expansion coefficient is about 1×10^{-4} /°C. in this case.

With this contrivance, the mounting reliability of the BGA is improved and at the same time the reliability of the BGA substrate itself (peeling proof) is improved.

For the material of the BGA substrate, epoxy resin and/or tetrafluoroethylene resin are used. The epoxy resin referred to in the present invention is a resin in which glass fiber, acrylic resin and the like is mixed with the epoxy resin. The tetrafluoroethylene resin referred to the present invention is a resin in which acrylic resin and the like are mixed with the tetrafluoroethylene resin.

The advantages of using an organic material for the material of the BGA substrate include (1) improvement in the mounting reliability, (2) achievement of low cost, and, in addition, (3) formation of an insulating layer with a dielectric constant of 3 to 5 or lower, so that a semiconductor device which can satisfy high-speed operation requirements can be produced.

Now, description is made of the manufacturing process of the semiconductor device. FIGS. 3(a)–3(d) and FIGS. 4(a)–4(c) are sectional views of one example of a manufacturing process of the semiconductor device according to the present invention. In FIGS. 3(a)–3(d) and FIGS. 4(a)–4(c), same reference numerals designate the same parts or corresponding parts in FIG. 1 and FIG. 2. Numeral 5a designates the first solder bump electrically connected to the external electrode (not illustrated) contained in the semiconductor chip 2, and numeral 5b designates the second solder bump electrically connected to the external electrodes (not illustrated) of a plurality of lines provided on the BGA substrate 1.

First of all, on the electrode contained in the semiconductor chip 2, the first solder bump 5a is provided, and similarly, the second solder bump 5b is provided on one end part of one of the plurality of lines of the BGA substrate 1 (see FIG. 3(a)). Then, flux material is applied to the region on which the second solder bump 5b is formed on the surface of the BGA substrate 1. The semiconductor chip 2 is placed on the BGA substrate 1, and the BGA substrate 1 and the semiconductor chip 2 are charged into a heat treatment furnace (so-called a reflow furnace) with the first solder bump 5a held in contact with the second bump 5b. As a result, the first solder bump 5a and the second solder bump 5b melt, and the first solder bump 5a contacted with the second solder bump 5b become integral. In FIG. 3(b), the first solder bump integrally formed with the second solder bump is designated as the solder bump 5. By the solder bump 5, the electrode contained in the semiconductor chip 2 is electrically connected to one of the plurality of lines of the BGA substrate (see FIG. 3(b)). In addition, after cleaning the flux material, the ring 4 is affixed to the BGA substrate 1 by the first adhesive layer 7a (see FIG. 3(c)). Then, the sealing resin is injected into a clearance between the BGA substrate 1 and the semiconductor chip 2, and is allowed to solidify to form the sealing member 8, the semiconductor chip 2 is fixed in close contact with the BGA substrate 1. Then, an adhesive is applied to the top surface of the semiconductor chip 2 to form the second adhesive layer 7b (see FIG. 4(a)). After applying an adhesive to the top surface of the ring 4 to prepare the first adhesive layer 7a, the heat spreader 3 is placed on the semiconductor chip 2 and the ring 4, and the heat spreader 3 is affixed to the semiconductor chip 2 and the ring 4 (see FIG. 4(b)). Lastly, the solder balls 6 are provided on the external electrodes of the semiconductor device connected to the other ends of the plurality of lines of the BGA substrate 1 and a semiconductor device is obtained (see FIG. 4(c)).

Because, as described above, the BGA substrate material comprising a plurality of insulating layers is formed with organic material that matches the thermal expansion characteristics of the circuit board, a semiconductor device with improved reliability to thermal stress can be obtained.

Embodiment 2

The solder bump shown in FIG. 2 is mounted in a peripheral region, which is the border portion of the semiconductor chip surface. FIG. 5 is a plan view showing solder bumps mounted in a rectangular ring at the periphery of the semiconductor chip surface. The same reference numerals designate the same parts or corresponding parts in FIG. 1 and FIG. 2. Because the outermost circumferential solder bumps 5c are located on the outermost circumferential row of the ring-form region, the difference is maximized when thermal expansion of the semiconductor chip and that of the BGA substrate occur, respectively, and disconnection of the solder bump is likely to occur. Because the innermost

circumferential solder bumps 5d are located on the innermost circumferential row of the ring-form region, stress caused by thermal shrinkage of the sealing member is great and disconnection of the solder bumps is likely to occur.

As described above, the outermost circumferential solder bumps and the innermost circumferential solder bumps have a problem in that disconnection is likely to occur due to large stress caused by thermal expansion or thermal shrinkage. The present embodiment is designed to align the positional relationship of the line on the insulating layer and the via hole between insulating layers with the problem taken into account, so that the line for power supply input to the semiconductor chip and the line for ground can be connected to the outermost circumferential solder bump 5c, the solder bump in the second row from the outermost solder bumps, and the innermost solder bump 5d. Since the line for power supply input and line for ground are equipped with auxiliary lines, respectively, even if any problem occurs in the joint of the solder bump due to thermal expansion of the semiconductor chip and thermal expansion of the BGA substrate, it would not affect at all the operational functions of the semiconductor chip. In addition, with respect to the outermost solder bumps, since the greatest thermal stress is exerted at four corners of the semiconductor chip, it is desirable not to provide connections using solder bumps. With this embodiment, a semiconductor device with improved reliability to thermal stress can be obtained.

Embodiment 3

In Embodiment 1 and Embodiment 2, a semiconductor device including the heat spreader and the ring was explained as one example of the semiconductor device, but the similar effects can be obtained even with the semiconductor device not including the heat spreader and the ring.

A semiconductor device according to the present invention comprises a BGA substrate composed of upper insulating layer in which a plurality of insulating layers are laminated, intermediate insulating layer, lower insulating layer in which a plurality of insulating layers are laminated; a plurality of lines provided on each top surface of the insulating layers included in the upper insulating layer, the intermediate insulating layer and lower insulating layer respectively; and a semiconductor chip having a plurality of electrodes to be connected to the plurality of lines respectively; wherein the semiconductor chip is connected with the plurality of solder balls through a plurality of via holes provided in each of all the insulating layers; and a material for the plurality of insulating layers comprises organic material which fits to thermal expansion characteristics of the substrate on which semiconductor device is mounted, and therefore, it is possible to obtain a semiconductor device with improved reliability to thermal stress.

A semiconductor device of the present invention has the thermal expansion characteristics of the circuit board expressed by the coefficient of linear expansion, wherein the difference of linear thermal expansion coefficient between the intermediate layer of the BGA substrate and the circuit board is within $1 \times 10^{-5}/^{\circ}\text{C}$., and the difference of linear thermal expansion coefficient among the materials within the BGA substrate is within $1 \times 10^{-4}/^{\circ}\text{C}$., therefore, it is possible to improve the mounting reliability.

A semiconductor device of this invention is desirable to contain at least one of the epoxy resin and tetrafluoroethylene resin for the said organic material.

A semiconductor device of this invention comprises a BGA substrate composed of upper insulating layer in which a plurality of insulating layers are laminated, intermediate insulating layer, lower insulating layer in which a plurality

of insulating layers are laminated; a plurality of lines provided on each top surface of the insulating layers included in the upper insulating layer, the intermediate insulating layer and lower insulating layer respectively; a plurality of solder balls provided on the outermost surface of the lower insulating layer; and a semiconductor chip having a plurality of electrodes to be connected to the plurality of lines respectively, the semiconductor chip is connected with the plurality of solder balls through a plurality of via holes provided in each of all the insulating layers;

wherein the plurality of electrodes are provided in the ring-form region of the semiconductor chip and the power supply and grounding conductor are connected to electrodes on the outermost circumferential and innermost circumferential rows, respectively. Therefore, it is possible to obtain a semiconductor with improved reliability to thermal stress.

A semiconductor device according to this invention comprises a BGA substrate composed of upper insulating layer in which a plurality of insulating layers are laminated, intermediate insulating layer, lower insulating layer in which a plurality of insulating layers are laminated; a plurality of lines provided on each top surface of the insulating layers included in the upper insulating layer, the intermediate insulating layer and lower insulating layer respectively; a plurality of solder balls provided on the outermost surface of the lower insulating layer and a semiconductor chip having a plurality of electrodes to be connected to the plurality of lines respectively;

wherein the semiconductor chip is connected electrically with the plurality of solder balls through a plurality of via holes provided in each of all the insulating layers; a sealing member comprising sealing resin to bring the semiconductor chip in close contact with the BGA substrate, a heat spreader for discharging heat generated in the semiconductor chips to the outside, a ring providing a specified clearance between the BGA substrate and the heat spreader as well as joining them both, wherein a material for the insulating layers comprises by organic material which fits to the thermal expansion characteristics of a circuit board on which the semiconductor device is mounted, and it is possible to obtain a semiconductor device with improved reliability to thermal stress.

It should be understood that the apparatus and methods which have been shown and described herein are illustrative of the invention and are not intended be limitative thereof. Clearly, those skilled in the art may conceive of variations or modifications to the invention. However, any such variations or modifications which falls within the purview of this description are intended to be included therein as well. The scope of the invention is limited only by the claims appended hereto.

What is claimed is:

1. A semiconductor device comprising:

- a ball grid array (BGA) substrate including an upper insulating layer comprising a plurality of laminated layers, an intermediate insulating layer, and a lower insulating layer comprising a plurality of laminated insulating layers;
- a plurality of lines on top surfaces of the insulating layers included in each of the upper, intermediate, and lower layers, respectively;
- a plurality of solder balls disposed on an outermost surface of the lower insulating layer; and
- a semiconductor chip having a plurality of electrodes connected to respective lines, the semiconductor chip being connected electrically to the plurality of solder balls through a plurality of via holes in each of the

9

- upper, lower, and intermediate insulating layers wherein the intermediate insulating layer is a material having thermal expansion characteristics substantially matching thermal expansion characteristics of a circuit board, the semiconductor device being mounted on the circuit board, and the upper and lower insulating layers have thermal expansion characteristics different from but similar to that of the intermediate insulating layer so that interlayer peeling of the BGA substrate is prevented.
2. The semiconductor device of claim 1, wherein the BGA substrate and the circuit board have respective linear thermal expansion coefficients and the linear thermal expansion coefficients of the intermediate layer of the BGA substrate and of the circuit board differ by less than $1 \times 10^{-5}/^{\circ}\text{C.}$, and the linear thermal expansion coefficients of materials within the BGA substrate differ by less than $1 \times 10^{-4}/^{\circ}\text{C.}$
3. The semiconductor device of claim 1, wherein the intermediate insulating layer is at least one of an epoxy resin and tetrafluoroethylene resin.
4. The semiconductor device of claim 1, wherein the plurality of electrodes are arranged in rows in a circumferential peripheral region of the semiconductor chip, and a power supply and ground are connected to the electrodes in outermost circumferential rows or innermost circumferential rows.
5. A semiconductor device comprising:
- a ball grid array (BGA) substrate including an upper insulating layer comprising a plurality of laminated layers, an intermediate insulating layer, and a lower

10

- insulating layer comprising a plurality of laminated insulating layers;
- a plurality of lines on top surfaces of the insulating layers included in each of the upper, intermediate, and lower layers, respectively;
- a plurality of solder balls disposed on an outermost surface of the lower insulating layer;
- a semiconductor chip having a plurality of electrodes connected to respective lines, wherein the semiconductor chip is connected electrically to the plurality of solder balls through a plurality of via holes in each of the upper, lower, and intermediate insulating layers;
- a sealing member comprising a sealing resin, bringing the semiconductor chip into contact with the BGA substrate;
- a heat spreader for discharging heat generated in the semiconductor chip; and
- a frame providing a separation between the BGA substrate and the heat spreader and joining the BGA substrate to the heat spreader, wherein the intermediate insulating layer is a material having thermal expansion characteristics substantially matching thermal expansion characteristics of a circuit board, the semiconductor device being mounted on the circuit board, and the upper and lower insulating layers have thermal expansion characteristics different from but similar to that of the intermediate insulating layer so that interlayer peeling of the BGA substrate is prevented.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,317,333 B1
DATED : November 13, 2001
INVENTOR(S) : Shinji Baba

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 5,

Line 27, change " $2 \times 10^{-5}^{\circ}\text{C}$ " to -- $2 \times 10^{-5}^{\circ}\text{C}$ --.

Signed and Sealed this

Twenty-third Day of April, 2002

Attest:

A handwritten signature in black ink, appearing to read "James E. Rogan", with a long horizontal flourish extending from the bottom of the signature.

Attesting Officer

JAMES E. ROGAN
Director of the United States Patent and Trademark Office

EXHIBIT E

Intentionally Omitted

Exhibit F

**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2013 to 12/31/2013 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 4 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
11/6/2013	EXDO6911090073	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	242.00	KG	21.00	CTN
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7/23/2013	PFSKOAK13070018	ASI CORP.	NVIDIA SINGAPORE PTE LTD.	SAID TO CONTAIN COMPUTER GRAPHICS CARD 8 6 CTNS PACKED IN 3 PALLETS	HONG KONG	OAKLAND,CA	505.00	K	86.00	CTN
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Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

Country of Origin - HS code

www.datamyne.comEmail: contact@datamyne.com[2005-2020 Datamyne - Terms of Use](#)

Exhibit G

**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2014 to 12/31/2014 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 15 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
12/15/2014	EXDO6911160406	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE LTD	COMPUTER GRAPHICS CARDS	HONG KONG	LOS ANGELES,CA	989.00	KG	69.00	CTN
11/15/2014	EXDO6911155348	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	205.00	KG	20.00	CTN
8/27/2014	EXDO6911139124	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	852.00	KG	68.00	CTN
8/19/2014	EXDO6911136952	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GRAPHIC CARDS	CHINA	LONG BEACH,CA	1,720.00	KG	400.00	CTN
8/2/2014	EXDO6911134426	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD FOR COMPUTER	HONG KONG	OAKLAND,CA	2,400.00	KG	79.00	CTN
7/25/2014	EXDO6911133478	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	1,960.00	KG	400.00	CTN
7/25/2014	EXDO6911133476	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	1,890.00	KG	400.00	CTN
7/24/2014	EXDO6911133479	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	1,930.00	KG	400.00	CTN
7/19/2014	EXDO6911132326	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD FOR E-GOODS	HONG KONG	OAKLAND,CA	2,404.00	KG	80.00	CTN
7/15/2014	EXDO6911132256	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	787.00	KG	71.00	CTN
7/11/2014	EXDO6911130665	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	2,005.00	KG	400.00	CTN
7/11/2014	EXDO6911130185	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD FOR E-GOODS	HONG KONG	OAKLAND,CA	2,415.00	KG	80.00	CTN

5/3/2014	BRAENYC0055746	AMERCIA II ELECTRONICS	NVIDIA SINGAPORE PTE LTD	PLYWOOD PALLETS) ELECTRONICS DETECT DEVICES ADP POWER SUPPLY INDUCTORS,BLUETHO OTH MODULE,TANTALUM CAPACITO ALUMINUM	HONG KONG	NEW YORK/NEWARK AREA, NEWARK, NEW JERSEY	637.00	K	159.00	CTN
4/4/2014	EXDO6911113056	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	178.00	KG	19.00	CTN
1/3/2014	EXDO6911099151	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	188.00	KG	20.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

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Exhibit H

**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2015 to 12/31/2015 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 2 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
6/22/2015	EXDO6490059923	EXPONENT, INC.	NVIDIA SINGAPORE PTE, LTD	DANGEROUS GOODS AS PER ATTACHED SHIPPERS DANGEROUS GOODS TRANSPORT	NETHERLANDS	BOSTON,MA	5.00	KG	1.00	PCS
6/1/2015	EXDO6911184456	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	4,104.00	KG	760.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

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Exhibit I

**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2016 to 12/31/2016 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 4 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
12/11/2016	EXDO6911267146	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	3,596.00	KG	756.00	CTN
11/30/2016	SCZE801160679	AMERICA II ELECTRONICS INC.	NVIDIA SINGAPORE PTE, LTD.	ELECTRONIC COMPONENTS (111 CTNS S.T.C. 4 PLT S)	HONG KONG	LONG BEACH,CA	596.00	KG	111.00	CTN
6/12/2016	EXDO6911239739	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHIC CARD	HONG KONG	OAKLAND,CA	1,389.00	KG	141.00	CTN
1/20/2016	EXDO6911221868	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	1,282.00	KG	128.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

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Exhibit J



USA Bills Import HOUSES
Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2017 to 12/31/2017 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 17 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
10/27/2017	EXDO6911311650	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	8,044.00	KG	480.00	CTN
10/20/2017	EXDO6911310215	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,810.00	KG	480.00	CTN
9/23/2017	EXDO6911305971	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	8,022.00	KG	480.00	CTN
9/23/2017	EXDO6911305965	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	8,020.00	KG	480.00	CTN
9/17/2017	EXDO6911304673	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,795.00	KG	480.00	CTN
9/17/2017	EXDO6911304671	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,728.00	KG	480.00	CTN
7/29/2017	EXDO6911298372	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM	HONG KONG	OAKLAND,CA	11,826.00	KG	480.00	CTN
7/15/2017	EXDO6911295852	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND THEREOF	HONG KONG	OAKLAND,CA	11,817.00	KG	480.00	CTN
6/10/2017	EXDO6911291070	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND / OR PARTS THEREOF	HONG KONG	OAKLAND,CA	1,221.00	KG	48.00	CTN
6/10/2017	EXDO6911290511	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND / OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,772.00	KG	480.00	CTN
5/12/2017	EXDO6911286829	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD	HONG KONG	OAKLAND,CA	4,363.00	KG	176.00	CTN
5/12/2017	EXDO6911286439	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD	HONG KONG	OAKLAND,CA	8,744.00	KG	352.00	CTN

5/7/2017	EXDO6911285643	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	3,950.00	KG	840.00	CTN
4/29/2017	EXDO6490071083	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD	LITHIUM ION BATTERIES HS: 850440 847330 950450 HS: 900490 847130 392890	NETHERLAND S	NEW YORK/NEWARK AREA, NEWARK, NEW JERSEY	200.00	KG	1.00	PCS
2/27/2017	EXDO6490070101	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD	LITHIUM ION BATTERIES HS: 850440 847330 950450 392690 847130 900490 950450	NETHERLAND S	NEW YORK/NEWARK AREA, NEWARK, NEW JERSEY	165.00	KG	1.00	PCS
2/19/2017	EXDO6911277658	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	3,847.00	KG	840.00	CTN
1/15/2017	EXDO6911272463	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND PARTS THEREOF	HONG KONG	OAKLAND,CA	6,000.00	KG	240.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

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Exhibit K

**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2018 to 12/31/2018 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 6 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
12/9/2018	EXDO6911363546	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM	HONG KONG	OAKLAND,CA	9,902.00	KG	480.00	CTN
10/23/2018	EXDO6911357007	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	VIDEO GAME ASSMBLY	HONG KONG	OAKLAND,CA	10,071.00	KG	480.00	CTN
10/11/2018	EXDO6911356636	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	VIDEO GAME ASSMBLY	HONG KONG	OAKLAND,CA	8,186.00	KG	480.00	CTN
9/22/2018	EXDO6911352904	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM	HONG KONG	OAKLAND,CA	8,249.00	KG	480.00	CTN
9/5/2018	EXDO6911351011	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM THEREOF SHIELD ANDROID TV GAME CONSOLE	HONG KONG	OAKLAND,CA	10,046.00	KG	482.00	CTN
2/2/2018	EXDO6911321964	AMERICA II ELECTRONICS INC.	NVIDIA SINGAPORE PTE LTD	ELECTRONIC COMPONENT ELECTRONIC COMPONENT	HONG KONG	JACKSONVILL E,FL	4,670.00	KG	888.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

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Exhibit L

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NVIDIA SINGAPORE PTE LTD

(Incorporated in Singapore. Registration Number 200003831M)

ANNUAL REPORT

For the financial year ended 25 January 2015



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Singapore

08 Jun 2020

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NVIDIA SINGAPORE PTE LTD
(Incorporated in Singapore)

ANNUAL REPORT
For the financial year ended 25 January 2015

Contents

	Page
Directors' Report	1
Statement by Directors	3
Independent Auditor's Report	4
Statement of Comprehensive Income	6
Balance Sheet	7
Statement of Changes in Equity	8
Statement of Cash Flows	9
Notes to the Financial Statements	10



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For the financial year ended 25 January 2015

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NVIDIA SINGAPORE PTE LTD

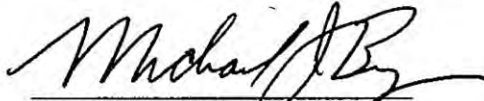
DIRECTORS' REPORT

For the financial year ended 25 January 2015

Independent auditor

The independent auditor, PricewaterhouseCoopers LLP, has expressed its willingness to accept re-appointment.

On behalf of the directors



MICHAEL JOHN BYRON
Director



KAREN THERESA BURNS
Director

'25 JUN 2015



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NVIDIA SINGAPORE PTE LTD

STATEMENT BY DIRECTORS

For the financial year ended 25 January 2015

In the opinion of the directors,

- (a) the financial statements as set out on pages 6 to 27 are drawn up so as to give a true and fair view of the state of affairs of the Company for the financial year ended 25 January 2015 and of the results of the business, changes in equity and cash flows of the Company for the financial year then ended; and
- (b) at the date of this statement, there are reasonable grounds to believe that the Company will be able to pay its debts as and when they fall due.

On behalf of the directors



MICHAEL JOHN BYRON
Director



KAREN THERESA BURNS
Director

25 JUN 2015



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**INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF
NVIDIA SINGAPORE PTE LTD**

Report on the Financial Statements

We have audited the accompanying financial statements of Nvidia Singapore Pte Ltd set out on pages 6 to 27, which comprise the balance sheet as at 25 January 2015, the statement of comprehensive income, statement of changes in equity and the statement of cash flows For the financial year ended 25 January 2015, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with the provisions of the Singapore Companies Act (the "Act") and Singapore Financial Reporting Standards, and for devising and maintaining a system of internal accounting controls sufficient to provide a reasonable assurance that assets are safeguarded against loss from unauthorised use or disposition; and transactions are properly authorised and that they are recorded as necessary to permit the preparation of true and fair profit and loss accounts and balance sheets and to maintain accountability of assets.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Singapore Standards on Auditing. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation of financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.



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**INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF
NVIDIA SINGAPORE PTE LTD (continued)**

Basis for Qualified Opinion

As described in Note 19 to the financial statements, no expense has been recognised in the statement of comprehensive income in respect of the fair value of share options granted by the ultimate holding corporation to the Company's employees. This is not in accordance with Financial Reporting Standard 102 – Share-based Payments ("FRS 102") which requires the Company to measure and recognise the fair value of share options granted by the ultimate holding corporation to its employees in the statement of comprehensive income with a corresponding increase recognised in equity as a contribution from the ultimate holding corporation. In the absence of a valuation by management of these share options granted, we are unable to perform any other audit procedures to estimate the effect on the financial statements of this departure from FRS 102.

Qualified Opinion

In our opinion, except for the possible effects of the matter described in the Basis for Qualified Opinion paragraph, the financial statements of the Company are properly drawn up in accordance with the provisions of the Act and Singapore Financial Reporting Standards so as to give a true and fair view of the state of affairs of the Company as at 25 January 2015, and the results, changes in equity and cash flows of the Company for the financial year ended on that date.

Report on Other Legal and Regulatory Requirements

In our opinion, the accounting and other records required by the Act to be kept by the Company have been properly kept in accordance with the provisions of the Act.



PricewaterhouseCoopers LLP
Public Accountants and Chartered Accountants

Singapore,

25 JUN 2015



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NVIDIA SINGAPORE PTE LTD**STATEMENT OF COMPREHENSIVE INCOME***For the financial year ended 25 January 2015*

	Note	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Revenue	3	3,885,594	3,461,212
Other income - net	3	612	527
Other gain - net	4	19	1,578
Expenses			
- Raw materials and other consumables consumed		(3,715,120)	(3,300,452)
- Employee compensation	6	(6,250)	(6,508)
- Travelling expenses		(232)	(588)
- Sales and marketing expenses		(5,152)	(6,541)
- Depreciation of plant and equipment		(829)	(765)
- Intercompany service expenses		(147,245)	(137,145)
- Rental on operating leases		(404)	(331)
- Other operating expenses	5	(6,086)	(4,600)
Total expenses		(3,881,318)	(3,456,930)
Profit before income tax		4,907	6,387
Income tax expense	7	(1,282)	(852)
Net profit after tax/total comprehensive income		3,625	5,535

*The accompanying notes form an integral part of these financial statements.***Certified True Copy**Asst. Registrar of Companies & Business Names
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NVIDIA SINGAPORE PTE LTD**BALANCE SHEET***As at 25 January 2015*

	Note	25/01/2015 US\$'000	26/01/2014 US\$'000
ASSETS			
Current assets			
Cash and cash equivalents	8	66,979	198,035
Trade and other receivables	9	711,098	676,720
Inventories	10	220,854	191,712
Prepayment and deposits		2,252	3,856
		<u>1,001,183</u>	<u>1,070,323</u>
Non-current assets			
Plant and equipment	11	744	1,498
Investment in subsidiary	12	85	85
Loan to related party	13	500	500
		<u>1,329</u>	<u>2,083</u>
Total assets		<u>1,002,512</u>	<u>1,072,406</u>
LIABILITIES			
Current liabilities			
Trade and other payables	14	968,867	1,042,846
Current income tax liabilities	7	746	286
		<u>969,613</u>	<u>1,043,132</u>
Total liabilities		<u>969,613</u>	<u>1,043,132</u>
NET ASSETS		<u>32,899</u>	<u>29,274</u>
SHAREHOLDER'S EQUITY			
Share capital	15	1	1
Retained earnings		<u>32,898</u>	<u>29,273</u>
		<u>32,899</u>	<u>29,274</u>

*The accompanying notes form an integral part of these financial statements.***Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CHANGES IN EQUITY***For the financial year ended 25 January 2015*

	Share capital US\$'000	Retained earnings US\$'000	Total equity US\$'000
2015			
Beginning of financial year	1	29,273	29,274
Total comprehensive income	-	3,625	3,625
End of financial year	1	32,898	32,899
2014			
Beginning of financial year	1	23,738	23,739
Total comprehensive income	-	5,535	5,535
End of financial year	1	29,273	29,274

*The accompanying notes form an integral part of these financial statements.***Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CASH FLOWS***For the financial year ended 25 January 2015*

	Note	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Cash flows from operating activities			
Net profit after tax		3,625	5,535
Adjustments for:			
- Tax		1,282	852
- Depreciation of plant and equipment		829	765
- Net loss on disposal of plant and equipment		-	2
- Interest income		(128)	(523)
Operating cash flow before working capital changes		5,608	6,631
Change in operating assets and liabilities			
- Trade and other receivables		(34,378)	286,510
- Inventories		(29,142)	29,377
- Trade and other payables		(73,979)	(321,784)
- Prepayments and deposits		1,604	(820)
Cash used in operations		(130,287)	(86)
Income tax paid		(822)	(1,206)
Net cash used in operating activities		(131,109)	(1,292)
Cash flows from investing activities			
Loan to related party		-	(500)
Purchases of plant and equipment		(75)	(818)
Proceeds from disposal of plant and equipment		-	7
Interest received		128	523
Net cash generated from/(used in) investing activities		53	(788)
Net decrease in cash and cash equivalents		(131,056)	(2,080)
Cash and cash equivalents at beginning of financial period		198,035	200,115
Cash and cash equivalents at end of financial period	8	66,979	198,035

*The accompanying notes form an integral part of these financial statements.***Certified True Copy**

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08 Jun 2020

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NVIDIA SINGAPORE PTE LTD**NOTES TO THE FINANCIAL STATEMENTS***For the financial year ended 25 January 2015*

These notes form an integral part of and should be read in conjunction with the accompanying financial statements.

1. General information

The Company is incorporated in Singapore. The address of its registered office is 112 Robinson Road, #05-01, Singapore 068902.

The principal activity of the Company consists of sales of graphics processors and media and communication devices.

The principal activities of its subsidiary are those relating to the solicitation and negotiation of orders and marketing on behalf of Nvidia Singapore Pte Ltd.

2. Significant accounting policies**(a) Basis of preparation**

The financial statements have been prepared in accordance with Singapore Financial Reporting Standards ("FRS") under the historical cost convention, except as disclosed in the accounting policies below.

The preparation of these financial statements in conformity with FRS requires management to exercise its judgement in the process of applying the Company's accounting policies. It also requires the use of certain critical accounting estimates and assumptions. There are no significant areas involving a higher degree of judgement, estimates and assumption to these financial statements.

Interpretations and amendments to published standards effective in 2015

On 27 January 2014, the Company adopted the new or amended FRS and Interpretations to FRS ("INT FRS") that are mandatory for application for the financial year. Changes to the Company's accounting policies have been made as required, in accordance with the relevant transitional provisions in the respective FRS and INT FRS.

The adoption of the above new or revised FRS did not result in any substantial changes to the Company's accounting policies nor any significant impact on these financial statements.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***2. Significant accounting policies (continued)****(b) Revenue recognition**

Revenue comprises the fair value of the consideration received or receivable for the sales of goods in the ordinary course of the Company's activities. Revenue is presented net of goods and services tax, rebates and discounts. Revenue is recognised as follows:

(1) *Sale of goods*

Revenue from sale of graphics processors and related media and communication devices is recognised when the Company has delivered the products to the customer, the customer has accepted the products and collectability of the related receivables is reasonably assured.

A sales return allowance for estimated product returns is established at the time revenue is recognised, based primarily on historical return rates.

(2) *Interest income*

Interest income is recognised using the effective interest method.

(c) Group accounting

These financial statements are the separate financial statements of Nvidia Singapore Pte Ltd. The Company is exempted from the preparation of consolidated financial statements as the Company is a wholly-owned subsidiary of Nvidia Corporation, a US-incorporated company which produces consolidated financial statements available for public use. The basis on which the subsidiary is accounted for is disclosed in Note 2(f). The main office of Nvidia Corporation is as follows: 2701 San Tomas Expressway, Santa Clara, CA 95050, U.S.A..

(d) Employee compensation**(1) *Defined contribution plans***

Defined contribution plans are post-employment benefit plans under which the Company pays fixed contributions into separate entities such as Mandatory Provident Fund and Superannuation Fund established in Hong Kong, on a mandatory, contractual or voluntary basis. The Company has no further payment obligations once the contributions have been paid. The Company's contribution to defined contribution plans are recognised as employee compensation expense when they are due.

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 25 January 2015

2. Significant accounting policies (continued)

(d) Employee compensation (continued)(2) *Employee leave entitlements*

Employee entitlements to annual leave are recognised when they accrue to employees. A provision is made for the estimated liability for annual leave as a result of services rendered by employees up to the balance sheet date.

(e) Plant and equipment(1) *Measurement*

Plant and equipment are initially recognised at cost and subsequently carried at cost less accumulated depreciation and accumulated impairment losses.

The cost of an item of plant and equipment initially recognised includes its purchase price and any cost that is directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. The projected cost of dismantlement, removal or restoration is recognised as part of the cost of plant and equipment if such obligation is incurred either when the item is acquired or as a consequence of using the asset during a particular period for purposes other than to produce inventories during that period.

(2) *Depreciation*

Depreciation on plant and equipment is calculated using the straight-line method to allocate their depreciable amounts over their estimated useful lives as follows:

	<u>Useful lives</u>
Machinery and equipment	3 to 5 years
Computer equipment	3 to 5 years
Office equipment	5 years
Furniture	5 years
Leasehold improvement	Lesser of estimated useful life or remaining lease term

The residual values, estimated useful lives and depreciation method of plant and equipment are reviewed, and adjusted as appropriate, at each balance sheet date. The effects of any revision are recognised in the statement of comprehensive income for the financial period in which the changes arise.



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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***2. Significant accounting policies (continued)****(e) Plant and equipment (continued)****(3) *Subsequent expenditure***

Subsequent expenditure relating to plant and equipment that has already been recognised is added to the carrying amount of the asset only when it is probable that future economic benefits associated with the item, will flow to the Company and the cost can be reliably measured. All other repair and maintenance expense is recognised in the statement of comprehensive income when incurred.

(4) *Disposal*

On disposal of an item of plant and equipment, the difference between the net disposal proceeds and its carrying amount is recognised in the statement of comprehensive income.

(f) Investment in subsidiary

Investment in subsidiary is carried at cost less accumulated impairment losses in the Company's balance sheet. On disposal of investment in subsidiary, the difference between disposal proceeds and the carrying amount of the investment is recognised in the statement of comprehensive income.

(g) Loan to related party

Loan to related party is initially recognised at fair value plus transaction costs and subsequently carried at amortised cost using the effective interest method, less accumulated impairment losses. The Company assesses at each balance sheet date whether there is objective evidence that this financial asset is impaired and recognises an allowance for impairment when such evidence exists.

(h) Impairment of non-financial assets

Plant and equipment and investment in subsidiary are reviewed for impairment whenever there is any objective evidence or indication that these assets may be impaired.

For the purpose of impairment testing, the recoverable amount (i.e. the higher of the fair value less cost to sell and value in use) is determined on an individual asset basis unless the asset does not generate cash flows that are largely independent of those from other assets. If this is the case, the recoverable amount is determined for the cash-generating unit (CGU) to which the asset belongs.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***2. Significant accounting policies (continued)****(h) Impairment of non-financial assets (continued)**

If the recoverable amount of the asset (or CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or CGU) is reduced to its recoverable amount. The difference between the carrying amount and recoverable amount is recognised in the statement of comprehensive income.

An impairment loss for an asset is reversed if, and only if, there has been a change in the estimates used to determine the assets' recoverable amount since the last impairment loss was recognised. The carrying amount of the asset is increased to its revised recoverable amount, provided that this amount does not exceed the carrying amount that would have been determined (net of any accumulated amortisation or depreciation) had no impairment loss been recognised for the asset in prior years. A reversal of impairment loss for an asset is recognised in the statement of comprehensive income.

(i) Financial assets

Receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. They are presented as current assets, except for those maturing later than 12 months after the balance sheet date which are presented as non-current assets. These financial assets are initially recognised at fair value plus transaction cost and subsequently carried at amortised cost using the effective interest method, less allowance for impairment.

The Company assesses at each balance sheet date whether there is objective evidence that these financial assets are impaired and recognises an allowance for impairment when such evidence exists.

The carrying amount of these assets is reduced through the use of an impairment allowance account which is calculated as the difference between the carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate.

(j) Trade and other payables

Trade and other payables are initially recognised at fair value and subsequently carried at amortised cost, using the effective interest method.

(k) Operating leases

Leases of assets where substantially all risks and rewards incidental to ownership are retained by the lessor are classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) are recognised in the statement of comprehensive income on a straight-line basis over the period of the lease.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***2. Significant accounting policies (continued)****(k) Operating leases (continued)**

When a lease is terminated before the lease period expires, any payment made by the Company as penalty is recognised as an expense in the period in which the termination takes place.

(l) Inventories

Inventories are carried at the lower of cost and net realisable value. Cost is determined using the first-in, first-out method. Net realisable value is the estimated selling price in the ordinary course of business, less applicable variable selling expenses.

(m) Income taxes

Current income tax for current and prior periods is recognised at the amount expected to be paid to or recovered from the tax authorities, using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date.

Deferred income tax is recognised for all temporary differences arising between the tax bases of assets and liabilities and their carrying amounts in the financial statements except when the deferred income tax arises from the initial recognition of goodwill or an asset or liability in a transaction that is not a business combination and affects neither accounting nor taxable profit or loss at the time of the transaction.

Current and deferred income tax is recognised as income or expense in the statement of comprehensive income, except to the extent that the tax arises from a business combination or a transaction which is recognised directly in equity.

(n) Provisions for other liabilities and charges

Provisions for other liabilities and charges are recognised when the Company has a present legal or constructive obligation as a result of past events, it is more likely than not that an outflow of resources will be required to settle the obligation and the amount has been reliably estimated.

(o) Currency translation

The financial statements of the Company are presented in United States Dollars, which is the functional currency of the Company.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***2. Significant accounting policies (continued)****(o) Currency translation (continued)**

Transactions in a currency other than United States Dollar ("foreign currency") are translated into United States Dollar using the exchange rates prevailing at the dates of the transactions. Currency translation differences resulting from the settlement of such transactions and from the translation of monetary assets and liabilities denominated in foreign currencies at the closing rates at the balance sheet date are recognised in the statement of comprehensive income.

(p) Cash and cash equivalents

For the purpose of presentation in the cash flow statement, cash and cash equivalents include cash on hand and deposits with financial institutions which are subject to an insignificant risk of change in value.

(q) Share capital

Ordinary shares are classified as equity.

3. Income

	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Revenue		
Sale of graphics processors and related media and communication devices	3,885,594	3,461,212
Other income – net:		
Interest income	128	523
Others	484	4
	<u>3,886,206</u>	<u>3,461,739</u>

4. Other gain - net

	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Exchange gains - net	<u>19</u>	<u>1,578</u>

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***5. Other operating expenses**

	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Consulting and professional expense	821	1,897
Utilities expense	110	119
Repair and maintenance expense	276	293
Bank charges	166	164
Bad debt expense / (reversal)	1,786	(847)
Insurance for credit	1,064	858
Other expenses	1,863	2,116
Total	<u>6,086</u>	<u>4,600</u>

6. Employee compensation

	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Wages and salaries	5,822	5,905
Employer's contribution to defined contribution plans	428	603
	<u>6,250</u>	<u>6,508</u>

The key management is directors of the Company and there is no key management personnel remuneration during the financial year (2014: US\$Nil).

7. Income tax**(a) Income tax expense**

	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Income tax expense attributable to profit is made up of:		
- Current income tax	<u>1,282</u>	<u>852</u>

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***7. Income tax (continued)****(a) Income tax expense (continued)**

The tax expense on profit differs from the amount that would arise using the Singapore standard rate of income tax as explained below:

	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Profit before tax	4,907	6,387
Tax calculated at a tax rate of 17% (2014: 17%)	834	1,086
Effects of:		
- Expenses not deductible for tax purposes	307	50
- Income not subject to tax	(12)	(226)
- Different tax rates in other countries	(24)	(32)
- Others	177	(26)
Tax charge	1,282	852

(b) Movements in current tax liabilities

	25/01/2015 US\$'000	26/01/2014 US\$'000
Beginning of financial year	286	640
Tax expense on profit - current financial year	1,282	852
Income tax paid	(822)	(1,206)
End of the financial year	746	286

8. Cash and cash equivalents

	25/01/2015 US\$'000	26/01/2014 US\$'000
Cash at bank	66,979	198,035

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***9. Trade and other receivables**

	25/01/2015 US\$'000	26/01/2014 US\$'000
Trade receivables:		
- Immediate holding company	48	48
- Non-related parties	419,802	387,524
Less: Allowance for impairment of receivables		
- Non-related parties	(2,546)	(760)
Trade receivables - net	<u>417,304</u>	<u>386,812</u>
Non-trade receivables:		
- Immediate holding company	190,696	193,332
- Other related companies	102,968	96,491
	<u>293,664</u>	<u>289,823</u>
Other receivables	<u>130</u>	<u>85</u>
	<u>711,098</u>	<u>676,720</u>

The non-trade receivables due from other related companies are unsecured, interest-free and are receivable on demand.

10. Inventories

	25/01/2015 US\$'000	26/01/2014 US\$'000
Finished goods	<u>220,854</u>	<u>191,712</u>

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 25 January 2015

11. Plant and equipment

	Computer equipment US\$'000	Machinery and equipment US\$'000	Office equipment US\$'000	Furniture US\$'000	Leasehold improvement US\$'000	Total US\$'000
2015						
<u>Cost</u>						
Beginning of financial year	1,996	2,651	68	26	1,257	5,998
Additions	16	24	24	-	11	75
Disposals	(1,146)	(1,153)	(64)	-	(1,071)	(3,434)
End of financial year	866	1,522	28	26	197	2,639
<u>Accumulated depreciation</u>						
Beginning of financial year	1,330	1,996	59	7	1,108	4,500
Depreciation charge	315	443	10	6	55	829
Disposals	(1,146)	(1,153)	(64)	-	(1,071)	(3,434)
End of financial year	499	1,286	5	13	92	1,895
Net book value						
End of financial year	367	236	23	13	105	744
2014						
<u>Cost</u>						
Beginning of financial year	2,305	2,406	186	26	1,244	6,167
Additions	532	273	-	-	13	818
Disposals	(841)	(28)	(118)	-	-	(987)
End of financial year	1,996	2,651	68	26	1,257	5,998
<u>Accumulated depreciation</u>						
Beginning of financial year	1,968	1,521	167	2	1,055	4,713
Depreciation charge	202	496	9	5	53	765
Disposals	(840)	(21)	(117)	-	-	(978)
End of financial year	1,330	1,996	59	7	1,108	4,500
Net book value						
End of financial year	666	655	9	19	149	1,498

12. Investment in subsidiary

	25/01/2015 US\$'000 \$	26/01/2014 US\$'000 \$
Unquoted equity shares at cost	85	85

Details of investment in subsidiary are as follows:

Name of company	Principal activities	Country of incorporation	Equity holding		Cost of investment	
			25/01/2015 %	26/01/2014 %	25/01/2015 US\$'000	26/01/2014 US\$'000
NVIDIA GK	Solicitation and negotiation of orders and working on behalf of Nvidia Singapore Pte Ltd	Japan	100	100	85	85

The subsidiary does not require an audit in accordance with the laws in the country of its incorporation.



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For the financial year ended 25 January 2015

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***16. Commitments**Operating lease commitments

The future minimum lease payable under non-cancellable operating leases contracted for at the balance sheet date but not recognised as liabilities are as follows:

	25/01/2015 US\$'000	26/01/2014 US\$'000
Not later than one year	433	398
Later than one year but not later than five years	578	1,011
	<u>1,011</u>	<u>1,409</u>

17. Financial risk management*Financial risk factors*

The Company's activities expose it to market risk (including currency risk, interest rate risk and price risk), credit risk and liquidity risk.

The management team is responsible for setting the objectives and underlying principles of financial risk management for the Company, and establishes detailed policies such as risk identification and measurement, exposure limits and hedging strategies. Financial risk management is carried out by finance personnel.

The finance personnel measure actual exposures against the limits set and prepare regular reports for the review of the management team. The information presented below is based on information received by key management.

(a) Market risk**(i) *Currency risk***

The Company's revenue, cost of operations and majority of the financial assets and liabilities are primarily in United States Dollar ("USD"). The Company is not exposed to any significant exchange rate risk. The Company does not purchase forward contracts to hedge this exposure.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***17. Financial risk management (continued)****(a) Market risk (continued)****(ii) *Price risk***

The Company has insignificant exposure to equity price risk as it does not hold any equity financial assets.

(iii) *Interest rate risk*

The Company is exposed to interest rate risk on its bank deposits. The bank deposits are mainly deposits in USD.

At 25 January 2015, if the USD interest rates had increased/decreased by 0.05% (2014: 0.05%) with all other variables including tax being constant, the profit after tax would have been higher/lower by US\$33,000 (2014: US\$98,500) as a result of higher/lower interest income on these deposits.

The Company has insignificant financial liabilities that are exposed to interest rate risks.

(b) Credit risk

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Company. The major classes of financial assets of the Company are cash and cash equivalents and trade receivables. Cash and cash equivalents are deposits in banks with sound credit ratings, therefore, the Company does not expect to have high credit risk in this regard. For trade receivables, the Company adopts the policy of dealing only with customers of appropriate credit history, and obtaining sufficient collateral where appropriate to mitigate credit risk. In addition, the Company monitors its credit risk on an ongoing basis by reviewing the debtors' aging to minimise its exposure to credit risk.

(i) *Financial assets that are neither past due nor impaired*

Trade receivables that are neither past due nor impaired are substantially companies with a good collection track record with the Company.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***17. Financial risk management (continued)****(b) Credit risk (continued)****(ii) *Financial assets that are past due and/or impaired***

There is no financial asset that is past due and/or impaired.

The carrying amount of trade receivables individually determined to be impaired and the movement in the related allowance for impairment are as follows:

	25/01/2015 US\$'000	26/01/2014 US\$'000
Gross amount	2,546	760
Less: Allowance for impairment	(2,546)	(760)
	-	-
Beginning of financial year	760	1,607
Allowance made/(utilised)	1,786	(847)
End of financial year (Note 9)	2,546	760

(c) Liquidity risk

The Company manage the liquidity risk by maintaining sufficient cash and bank balances to enable it to meet its operational requirements.

(d) Capital risk

The Company's objectives when managing capital are to ensure that the Company is adequately capitalised and to maintain an optimal capital structure.

The Company is not subject to any externally imposed capital requirements.

(e) Financial instruments by category

The carrying amounts of financial assets at fair value through profit or loss are disclosed on the face of the balance sheet. The aggregate carrying amounts of loans and receivables and financial liabilities at amortised cost are as follows:

	25/01/2015 2015 US\$'000	26/01/2014 2014 US\$'000
Loans and receivables	777,948	874,670
Financial liabilities at amortised cost	968,609	1,042,611

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***17. Financial risk management (continued)****(f) Offsetting financial assets and financial liabilities****(i) *Financial assets***

The Company has the following financial instrument subject to enforceable master netting arrangement or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial assets	Gross amounts - financial liabilities	Net amounts - financial assets presented in the balance sheet	Financial assets	Net amount
As at 25 January 2015					
Trade and other receivables	204,660	13,964	190,696	103,016	293,712
Total	204,660	13,964	190,696	103,016	293,712
As at 26 January 2014					
Trade and other receivables	204,666	11,334	193,332	96,539	289,871
Total	204,666	11,334	193,332	96,539	289,871

(ii) *Financial liabilities*

The Company has the following financial instruments subject to enforceable master netting arrangements or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial liabilities	Gross amounts - financial assets	Net amounts - financial liabilities presented in the balance sheet	Financial liabilities	Net amount
As at 25 January 2015					
Trade and other payables	1,092,212	353,480	738,732	77,958	816,690
Total	1,092,212	353,480	738,732	77,958	816,690
As at 26 January 2014					
Trade and other payables	837,299	337,880	499,419	385,370	884,789
Total	837,299	337,880	499,419	385,370	884,789

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 25 January 2015***18. Immediate and ultimate holding corporations**

The Company's immediate holding corporation is Nvidia International Inc., incorporated in the Cayman Islands. The Company's ultimate holding corporation is Nvidia Corporation, incorporated in United States of America.

19. Related party transactions

In addition to the information disclosed elsewhere in the financial statements, the following transactions took place between the Company and related parties at terms agreed between the parties:

	27/01/2014 to 25/01/2015 US\$'000	28/01/2013 to 26/01/2014 US\$'000
Purchases from immediate holding company	3,483,981	3,124,542
Intercompany services on marketing and administrative expenses paid and payable to other related corporations	<u>147,245</u>	<u>137,145</u>

No expense has been recorded in respect of the fair value of share options granted by the ultimate holding corporation to the Company's employees in the statement of comprehensive income. This is not in accordance with Financial Reporting Standard 102 – Share-based Payments which requires the Company to measure and recognise the fair value of share options granted by the ultimate holding corporation to its employees in the statement of comprehensive income with a corresponding increase recognised in equity as a contribution from the ultimate holding corporation.

The Company participates in the centralised cash pooling arrangement with Nvidia Corporation, its ultimate holding company. During the year, certain balances with related companies were settled and netted off through the cash pooling arrangement.

Share based payments have not been recorded as the directors are of the opinion that this process would involve expense or delay out of proportion to the value to the shareholder of the Company.

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 25 January 2015

20. New or revised accounting standards and interpretations

The Company has not early adopted any mandatory standards, amendments and interpretations to existing standards that have been published but are only effective for the Company's accounting periods beginning on or after 26 January 2015. However, management anticipates that the adoption of these standards, amendments and interpretations will not have a material impact on the financial statements of the Company in the period of their initial adoption.

21. Authorisation of financial statements

These financial statements were authorised for issue in accordance with a resolution of the Board of Directors of Nvidia Singapore Pte Ltd on **25 JUN 2015**



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Exhibit M

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NVIDIA SINGAPORE PTE LTD

(Incorporated in Singapore. Registration Number 200003831M)

FINANCIAL STATEMENT

For the financial year ended 31 January 2016



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NVIDIA SINGAPORE PTE LTD
(Incorporated in Singapore)

FINANCIAL STATEMENT
For the financial year ended 31 January 2016

Contents

	Page
Directors' Statement	1
Independent Auditor's Report	3
Statement of Comprehensive Income	4
Balance Sheet	5
Statement of Changes in Equity	6
Statement of Cash Flows	7
Notes to the Financial Statements	8



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NVIDIA SINGAPORE PTE LTD

DIRECTORS' STATEMENT

For the financial year ended 31 January 2016

The directors present their report to the shareholder together with the audited financial statements for the financial year ended 31 January 2016.

In the opinion of the directors,

- (a) the financial statements as set out on pages 4 to 31 are drawn up so as to give a true and fair view of the financial position of the Company at 31 January 2016 and the financial performance, changes in equity and cash flows of the Company for the financial year covered by the financial statements; and
- (b) at the date of this statement, there are reasonable grounds to believe that the Company will be able to pay its debts as and when they fall due.

Directors

The directors in office at the date of this report are as follows:

Lee Kay Beng
Karen Theresa Burns
Michael John Byron
Rebecca Peters (appointed on 31 May 2016)

Arrangements to enable directors to acquire shares and debentures

Neither at the end of nor at any time during the financial year was the Company a party to any arrangement whose object was to enable the directors of the Company to acquire benefits by means of the acquisition of shares in, or debentures of, the Company or any other body corporate.

Directors' interests in shares and debentures

According to the register of directors' shareholdings, none of the directors holding office at the end of the financial year had any interest in the shares or debentures of the Company or its related corporations.

Share options

No options were granted during the financial year to subscribe for unissued shares of the Company.

No shares were issued during the financial year by virtue of the exercise of options to take up unissued shares of the Company.

There were no unissued shares of the Company under option at the end of the financial year.



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NVIDIA SINGAPORE PTE LTD

DIRECTORS' STATEMENT

For the financial year ended 31 January 2016

Independent auditor

The independent auditor, PricewaterhouseCoopers LLP, has expressed its willingness to accept re-appointment.

On behalf of the directors


MICHAEL JOHN BYRON
Director


KAREN THERESA BURNS
Director

13 JUL 2016



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**INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF
NVIDIA SINGAPORE PTE LTD**

Report on the Financial Statements

We have audited the accompanying financial statements of Nvidia Singapore Pte Ltd set out on pages 4 to 31, which comprise the balance sheet as at 31 January 2016, the statement of comprehensive income, statement of changes in equity and the statement of cash flows for the financial year ended 31 January 2016, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with the provisions of the Singapore Companies Act (the "Act") and Singapore Financial Reporting Standards, and for devising and maintaining a system of internal accounting controls sufficient to provide a reasonable assurance that assets are safeguarded against loss from unauthorised use or disposition; and transactions are properly authorised and that they are recorded as necessary to permit the preparation of true and fair profit and loss accounts and balance sheets and to maintain accountability of assets.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Singapore Standards on Auditing. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation of financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

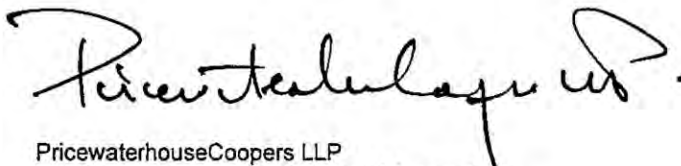
We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements of the Company are properly drawn up in accordance with the provisions of the Act and Singapore Financial Reporting Standards so as to give a true and fair view of the financial position of the Company as at 31 January 2016, and of the financial performance, changes in equity and cash flows of the Company for the year ended on that date.

Report on Other Legal and Regulatory Requirements

In our opinion, the accounting and other records required by the Act to be kept by the Company have been properly kept in accordance with the provisions of the Act.



PricewaterhouseCoopers LLP
Public Accountants and Chartered Accountants
Singapore,

13 JUL 2016



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NVIDIA SINGAPORE PTE LTD**STATEMENT OF COMPREHENSIVE INCOME***For the financial year ended 31 January 2016*

	Note	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Revenue	3	4,077,896	3,885,594
Other income - net	3	134	612
Other gain - net	4	4	19
Expenses			
- Raw materials and other consumables consumed		(3,896,460)	(3,715,120)
- Employee compensation	6	(7,356)	(6,794)
- Travelling expenses		(200)	(232)
- Sales and marketing expenses		(5,258)	(5,152)
- Depreciation of plant and equipment		(478)	(829)
- Intercompany service expenses		(159,282)	(147,245)
- Rental on operating leases		(439)	(404)
- Other operating expenses	5	(4,695)	(6,086)
Total expenses		(4,074,168)	(3,881,862)
Profit before income tax		3,866	4,363
Income tax expense	7	(843)	(1,282)
Net profit after tax/ Total comprehensive income		3,023	3,081

The accompanying notes form an integral part of these financial statements.**Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**BALANCE SHEET***As at 31 January 2016*

	Note	31/01/2016 US\$'000	25/01/2015 US\$'000 (restated)	27/01/2014 US\$'000 (restated)
ASSETS				
Current assets				
Cash and cash equivalents	8	223,210	66,979	198,035
Trade and other receivables	9	704,405	711,098	676,720
Inventories	10	208,883	220,854	191,712
Prepayment and deposits		1,052	2,252	3,856
		<u>1,137,550</u>	<u>1,001,183</u>	<u>1,070,323</u>
Non-current assets				
Plant and equipment	11	316	744	1,498
Investment in subsidiary	12	85	85	85
Loan to related party	13	500	500	500
		<u>901</u>	<u>1,329</u>	<u>2,083</u>
Total assets		<u>1,138,451</u>	<u>1,002,512</u>	<u>1,072,406</u>
LIABILITIES				
Current liabilities				
Trade and other payables	14	1,101,716	968,867	1,042,846
Current income tax liabilities	7	70	746	286
		<u>1,101,786</u>	<u>969,613</u>	<u>1,043,132</u>
Total liabilities		<u>1,101,786</u>	<u>969,613</u>	<u>1,043,132</u>
NET ASSETS		<u>36,665</u>	<u>32,899</u>	<u>29,274</u>
SHAREHOLDER'S EQUITY				
Share capital	15	1	1	1
Other reserves		9,524	8,781	8,237
Retained earnings		27,140	24,117	21,036
		<u>36,665</u>	<u>32,899</u>	<u>29,274</u>

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CHANGES IN EQUITY***For the financial year ended 31 January 2016*

	<u>Share capital</u> US\$'000	<u>Other reserves</u> US\$'000	<u>Retained earnings</u> US\$'000	<u>Total equity</u> US\$'000
2016				
Beginning of financial year - restated	1	8,781	24,117	32,899
Share-based compensation	-	743	-	743
Total comprehensive income	-	-	3,023	3,023
End of financial year	1	9,524	27,140	36,665
2015				
Beginning of financial year - restated	1	8,237	21,036	29,274
Share-based compensation	-	544	-	544
Total comprehensive income	-	-	3,081	3,081
End of financial year - restated	1	8,781	24,117	32,899

The accompanying notes form an integral part of these financial statements.**Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CASH FLOWS***For the financial year ended 31 January 2016*

	Note	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000 (restated)
Cash flows from operating activities			
Net profit after tax		3,023	3,081
Adjustments for:			
- Tax		843	1,282
- Depreciation of plant and equipment		478	829
- Share-based compensation		743	544
- Interest income		(119)	(128)
Operating cash flow before working capital changes		4,968	5,608
Change in operating assets and liabilities			
- Trade and other receivables		6,693	(34,378)
- Inventories		11,971	(29,142)
- Trade and other payables		132,849	(73,979)
- Prepayments and deposits		1,200	1,604
Cash generated/(used) in operations		157,681	(130,287)
Income tax paid		(1,519)	(822)
Net cash generated from/(used) in operating activities		156,162	(131,109)
Cash flows from investing activities			
Purchases of plant and equipment		(82)	(75)
Proceeds from disposal of plant and equipment		32	-
Interest received		119	128
Net cash generated from investing activities		69	53
Net increase/(decrease) in cash and cash equivalents		156,231	(131,056)
Cash and cash equivalents at beginning of financial period		66,979	198,035
Cash and cash equivalents at end of financial period	8	223,210	66,979

The accompanying notes form an integral part of these financial statements.**Certified True Copy**

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For the financial year ended 31 January 2016

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(b) Revenue recognition**

Revenue comprises the fair value of the consideration received or receivable for the sales of goods in the ordinary course of the Company's activities. Revenue is presented net of goods and services tax, rebates and discounts. Revenue is recognised as follows:

(1) *Sale of goods*

Revenue from sale of graphics processors and related media and communication devices is recognised when the Company has delivered the products to the customer, the customer has accepted the products and collectability of the related receivables is reasonably assured.

A sales return allowance for estimated product returns is established at the time revenue is recognised, based primarily on historical return rates.

(2) *Interest income*

Interest income is recognised using the effective interest method.

(c) Group accounting

These financial statements are the separate financial statements of Nvidia Singapore Pte Ltd. The Company is exempted from the preparation of consolidated financial statements as the Company is a wholly-owned subsidiary of Nvidia Corporation, a US-incorporated company which produces consolidated financial statements available for public use. The basis on which the subsidiary is accounted for is disclosed in Note 2(f). The main office of Nvidia Corporation is as follows: 2701 San Tomas Expressway, Santa Clara, CA 95050, U.S.A..

(d) Employee compensation**(1) *Defined contribution plans***

Defined contribution plans are post-employment benefit plans under which the Company pays fixed contributions into separate entities such as Mandatory Provident Fund and Superannuation Fund established in Hong Kong, on a mandatory, contractual or voluntary basis. The Company has no further payment obligations once the contributions have been paid. The Company's contribution to defined contribution plans are recognised as employee compensation expense when they are due.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(d) Employee compensation (continued)****(2) *Employee leave entitlements***

Employee entitlements to annual leave are recognised when they accrue to employees. A provision is made for the estimated liability for annual leave as a result of services rendered by employees up to the balance sheet date.

(3) *Share-based compensation*

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards under these plans include stock options, restricted share units ("RSUs") and employee stock purchase plan ("ESPP").

The Company accounts for share based payments in accordance with FRS 102 – Share based payments. Share based compensation expense is measured at the grant date of the related equity awards, based on the fair value of the awards, and the expense is recognised over the vesting period, with a corresponding increase in the other reserve.

In case of exchange of employees' services, the equity-settled payment is measured at the fair value of equity instruments granted to employees. If exercisable at the time of grant, equity-settled payment is included in relevant cost or expenses at fair value at grant date and capital surplus is increased accordingly; if exercisable after service in waiting period is completed or specified performance conditions are met, the service obtained in current period is included in relevant cost and expenses at fair value based on the best estimation on quantity of exercisable equity instruments made by the Company in accordance with latest changes in the number of exercisable employees and subsequent information such as whether specified performance conditions are met, and capital surplus is increased accordingly.

Stock options

The total amount to be recognised over the vesting period is determined by reference to the fair value of the options on the date of the grant.

The fair value of stock options is determined using option pricing model. The fair value of stock appreciation right is determined using Bimomial option pricing model.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(d) Employee compensation (continued)****(3) Share-based compensation (continued)****Stock options (continued)**

At the balance sheet date, subsequent information indicates that the number of equity instruments which are different with previous estimates should be adjusted to the exercisable number of equity instruments on the vesting date. After vesting date, no further adjustment will be raised for relevant cost (expense) or total owner's equity which has been recognised.

Stock options granted to employees, subject to certain exceptions, vest over a four year period, subject to continued service, with 25% vesting on the anniversary of the hire date in the case of new hires or the anniversary of the date of grant in the case of grants to existing employees and 6.25% vesting at the end of each quarterly period thereafter. Stock options granted under the 2007 Plan generally expire ten years from the date of grant.

Restricted Stock Units ("RSU")

RSUs granted to employees vest four years, subject to continued service, with 25% vesting on a pre-determined date that is close to the anniversary of the date of grant and 12.5% vesting semi-annually thereafter until fully vested. The total amount to be recognised over the vesting period is determined by reference to the fair value of the ultimate holding corporation stock on the date of the grant.

Employee Stock Purchase Plan ("ESPP")

Employees are also eligible to participate in an offering to have up to 10% of their earnings withheld up to certain limitations and applied on specified dates determined by the Board of Directors of Nvidia Corporation to the purchase of shares of common stock. The Board of Directors of Nvidia Corporation may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded. The employee benefit is recognised in profit or loss in the period in which the employees purchase the shares under common stock under the ESPP.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(e) Plant and equipment****(1) *Measurement***

Plant and equipment are initially recognised at cost and subsequently carried at cost less accumulated depreciation and accumulated impairment losses.

The cost of an item of plant and equipment initially recognised includes its purchase price and any cost that is directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. The projected cost of dismantlement, removal or restoration is recognised as part of the cost of plant and equipment if such obligation is incurred either when the item is acquired or as a consequence of using the asset during a particular period for purposes other than to produce inventories during that period.

(2) *Depreciation*

Depreciation on plant and equipment is calculated using the straight-line method to allocate their depreciable amounts over their estimated useful lives as follows:

	<u>Useful lives</u>
Machinery and equipment	3 - 5 years
Computer equipment	3 - 5 years
Office equipment	5 years
Furniture	5 years
Leasehold improvement	Lesser of estimated useful life or remaining lease term

The residual values, estimated useful lives and depreciation method of plant and equipment are reviewed, and adjusted as appropriate, at each balance sheet date. The effects of any revision are recognised in the statement of comprehensive income for the financial period in which the changes arise.

(3) *Subsequent expenditure*

Subsequent expenditure relating to plant and equipment that has already been recognised is added to the carrying amount of the asset only when it is probable that future economic benefits associated with the item, will flow to the Company and the cost can be reliably measured. All other repair and maintenance expense is recognised in the statement of comprehensive income when incurred.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(e) Plant and equipment (continued)****(4) Disposal**

On disposal of an item of plant and equipment, the difference between the net disposal proceeds and its carrying amount is recognised in the statement of comprehensive income.

(f) Investment in subsidiary

Investment in subsidiary is carried at cost less accumulated impairment losses in the Company's balance sheet. On disposal of investment in subsidiary, the difference between disposal proceeds and the carrying amount of the investment is recognised in the statement of comprehensive income.

(g) Loan to related party

Loan to related party is initially recognised at fair value plus transaction costs and subsequently carried at amortised cost using the effective interest method, less accumulated impairment losses. The Company assesses at each balance sheet date whether there is objective evidence that this financial asset is impaired and recognises an allowance for impairment when such evidence exists.

(h) Impairment of non-financial assets

Plant and equipment and investment in subsidiary are tested for impairment whenever there is any objective evidence or indication that these assets may be impaired.

For the purpose of impairment testing, the recoverable amount (i.e. the higher of the fair value less cost to sell and value in use) is determined on an individual asset basis unless the asset does not generate cash flows that are largely independent of those from other assets. If this is the case, the recoverable amount is determined for the cash-generating unit (CGU) to which the asset belongs.

If the recoverable amount of the asset (or CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or CGU) is reduced to its recoverable amount. The difference between the carrying amount and recoverable amount is recognised in the statement of comprehensive income.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(h) Impairment of non-financial assets (continued)**

An impairment loss for an asset is reversed if, and only if, there has been a change in the estimates used to determine the assets' recoverable amount since the last impairment loss was recognised. The carrying amount of this asset is increased to its revised recoverable amount, provided that this amount does not exceed the carrying amount that would have been determined (net of any accumulated amortisation or depreciation) had no impairment loss been recognised for the asset in prior years. A reversal of impairment loss for an asset is recognised in profit or loss.

(i) Loans and receivables**Bank balances**

Receivables are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. They are presented as current assets, except for those maturing later than 12 months after the balance sheet date which are presented as non-current assets. These financial assets are initially recognised at fair value plus transaction cost and subsequently carried at amortised cost using the effective interest method, less allowance for impairment.

The Company assesses at each balance sheet date whether there is objective evidence that these financial assets are impaired and recognises an allowance for impairment when such evidence exists.

The carrying amount of these assets is reduced through the use of an impairment allowance account which is calculated as the difference between the carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate.

(j) Trade and other payables

Trade and other payables are initially recognised at fair value and subsequently carried at amortised cost, using the effective interest method.

(k) Operating leases

Leases of assets where substantially all risks and rewards incidental to ownership are retained by the lessor are classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) are recognised in profit or loss on a straight-line basis over the period of the lease.

When a lease is terminated before the lease period expires, any payment made by the Company as penalty is recognised as an expense in the period in which the termination takes place.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(l) Inventories**

Inventories are carried at the lower of cost and net realisable value. Cost is determined using the first-in, first-out method. Net realisable value is the estimated selling price in the ordinary course of business, less applicable variable selling expenses.

(m) Income taxes

Current income tax is recognised at the amount expected to be paid to or recovered from the tax authorities, using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date.

Deferred income tax is recognised for all temporary differences except when the deferred income tax arises from the initial recognition of an asset or liability that affects neither accounting nor taxable profit or loss at the time of the transaction.

Current and deferred income tax is measured using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date, and are recognised as income or expenses in profit or loss, except to the extent that the tax arises from a transaction which is recognised directly in equity.

(n) Provisions for other liabilities and charges

Provisions for other liabilities and charges are recognised when the Company has a present legal or constructive obligation as a result of past events, it is more likely than not that an outflow of resources will be required to settle the obligation and the amount has been reliably estimated.

(o) Currency translation

The financial statements of the Company are presented in United States Dollars, which is the functional currency of the Company.

Transactions in a currency other than United States Dollar ("foreign currency") are translated into United States Dollar using the exchange rates prevailing at the dates of the transactions. Currency translation differences resulting from the settlement of such transactions and from the translation of monetary assets and liabilities denominated in foreign currencies at the closing rates at the balance sheet date are recognised in profit or loss.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***2. Significant accounting policies (continued)****(p) Cash and cash equivalents**

For the purpose of presentation in the cash flow statement, cash and cash equivalents include cash on hand and deposits with financial institutions which are subject to an insignificant risk of change in value.

(q) Share capital

Ordinary shares are classified as equity.

3. Income

	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Revenue		
Sale of graphics processors and related media and communication devices	4,077,896	3,885,594
Other income – net:		
Interest income	119	128
Others	15	484
	4,078,030	3,886,206

4. Other gain – net

	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Exchange gains - net	4	19

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***5. Other operating expenses**

	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Consulting and professional expense	1,344	1,131
Utilities expense	104	110
Repair and maintenance expense	283	276
Bank charges	117	166
Bad debt expense/(reversal)	157	1,786
Insurance for credit	1,180	1,064
Engineering and testing expense	713	1,073
Restructuring expense	340	-
Other expenses	457	480
Total	4,695	6,086

6. Employee compensation

	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Wages and salaries	6,134	5,822
Employer's contribution to defined contribution plans	479	428
Share-based compensation	743	544
	7,356	6,794

The key management is directors of the Company and there is no key management personnel remuneration during the financial year (2015: US\$Nil).

7. Income tax**(a) Income tax expense**

	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Income tax expense attributable to profit is made up of:		
- Current income tax	843	1,282

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***7. Income tax (continued)****(a) Income tax expense (continued)**

The tax expense on profit differs from the amount that would arise using the Singapore standard rate of income tax as explained below:

	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Profit before tax	3,866	4,363
Tax calculated at a tax rate of 17% (2015: 17%)	657	742
Effects of:		
- Expenses not deductible for tax purposes	207	397
- Income not subject to tax	(22)	(12)
- Write off of bad debts	(156)	-
- Different tax rates in other country	(19)	(22)
- Others	176	177
Tax charge	843	1,282

(b) Movements in current tax liabilities

	31/01/2016 US\$'000	25/01/2015 US\$'000
Beginning of financial year	746	286
Tax expense on profit - current financial year	843	1,282
Income tax paid	(1,519)	(822)
End of the financial year	70	746

8. Cash and cash equivalents

	31/01/2016 US\$'000	25/01/2015 US\$'000
Cash at bank	223,210	66,979

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***9. Trade and other receivables**

	31/01/2016 US\$'000	25/01/2015 US\$'000
Trade receivables:		
- Immediate holding company	48	48
- Non-related parties	427,874	419,802
Less: Allowance for impairment of receivables		
- Non-related parties	(1,756)	(2,546)
Trade receivables - net	426,166	417,304
Non-trade receivables:		
- Immediate holding company	185,717	190,696
- Other related companies	91,943	102,968
	277,660	293,664
Other receivables	579	130
	704,405	711,098

The non-trade receivables due from immediate holding company and other related companies are unsecured, interest-free and are repayable on demand.

10. Inventories

	31/01/2016 US\$'000	25/01/2015 US\$'000
Finished goods	208,883	220,854

11. Plant and equipment

	Computer equipment US\$'000	Machinery and equipment US\$'000	Office equipment US\$'000	Furniture US\$'000	Leasehold improvement US\$'000	Total US\$'000
2016						
<u>Cost</u>						
Beginning of financial year	866	1,522	28	26	197	2,639
Additions	65	12	-	-	5	82
Disposals	(410)	(1,212)	-	-	-	(1,622)
End of financial year	521	322	28	26	202	1,099
<u>Accumulated depreciation</u>						
Beginning of financial year	499	1,286	5	13	92	1,895
Depreciation charge	239	183	6	5	45	478
Disposals	(378)	(1,212)	-	-	-	(1,590)
End of financial year	360	257	11	18	137	783
Net book value						
End of financial year	161	65	17	8	65	316

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***11. Plant and equipment (continued)**

	Computer equipment US\$'000	Machinery and equipment US\$'000	Office equipment US\$'000	Furniture US\$'000	Leasehold improvement US\$'000	Total US\$'000
2015						
<u>Cost</u>						
Beginning of financial year	1,996	2,651	68	26	1,257	5,998
Additions	16	24	24	-	11	75
Disposals	(1,146)	(1,153)	(64)	-	(1,071)	(3,434)
End of financial year	866	1,522	28	26	197	2,639
<u>Accumulated depreciation</u>						
Beginning of financial year	1,330	1,996	59	7	1,108	4,500
Depreciation charge	315	443	10	6	55	829
Disposals	(1,146)	(1,153)	(64)	-	(1,071)	(3,434)
End of financial year	499	1,286	5	13	92	1,895
Net book value						
End of financial year	367	236	23	13	105	744

12. Investment in subsidiary

	31/01/2016 US\$'000	25/01/2015 US\$'000
Unquoted equity shares at cost	85	85

Details of investment in subsidiary are as follows:

Name of company	Principal activities	Country of incorporation	Equity holding		Cost of investment	
			31/01/2016 %	25/01/2015 %	31/01/2016 US\$'000	25/01/2015 US\$'000
NVIDIA GK	Solicitation and negotiation of orders and working on behalf of Nvidia Singapore Pte Ltd	Japan	100	100	85	85

The subsidiary does not require an audit in accordance with the laws in the country of its incorporation.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***13. Loan to related party**

The loan to Nvidia Brazil is unsecured, denominated in the United States Dollar and is due in full on 7 August 2023. The contractual interest rate on the loan at balance sheet date is 3.0% (2015: 3.0%) per annum. The carrying amount of the loan approximate its fair value.

14. Trade and other payables

	31/01/2016 US\$'000	25/01/2015 US\$'000
Trade payables		
- Immediate holding company	864,103	768,850
	<u>864,103</u>	<u>768,850</u>
Non-trade payables		
- Immediate holding company	4,119	4,157
- Other related companies	57,657	43,683
	<u>61,776</u>	<u>47,840</u>
Accrued operating expenses	169,729	146,686
Other payables	6,108	5,491
	<u>175,837</u>	<u>152,177</u>
	<u>1,101,716</u>	<u>968,867</u>

The non-trade payables to immediate holding company and other related companies are unsecured, interest-free and are repayable on demand.

15. Share capital

The Company's share capital comprise fully paid-up 2 (2015: 2) ordinary shares with no par value, amounting to a total of US\$1,000 (2015: US\$1,000).

16. Other reserves

	31/01/2016 US\$'000	25/01/2015 US\$'000 (restated)
Beginning of financial year	8,781	8,237
Employee share-based payment scheme		
- Value of employee services	743	544
End of financial year	<u>9,524</u>	<u>8,781</u>

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***17. Share based payments**

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards include share options, restricted share units ("RSUs"), and employee share purchase plan ("ESPP"), are granted under the following plans:

Amended and Restated 2007 Equity Incentive Plan

The Nvidia Corporation 2007 Equity Incentive Plan was approved in 2007, and subsequently amended and restated in 2012, 2013 and 2014, or the Restated 2007 Plan. This plan authorizes the issuance of share options and restricted share units.

Share options granted to employees, subject to certain exceptions, vest over a four year period subject to continued service, and generally expire ten years from the date of grant.

Subject to certain exceptions, RSUs granted to employees vest over a four year period, subject to continued service.

1998 and 2012 Employee Share Purchase Plan

The Nvidia Corporation 2012 Employee Share Purchase Plan was approved in 2012, and subsequently amended and restated in 2014, or the Restated 2012 Plan, as the successor to the 1998 Employee Share Purchase Plan.

Employees who participate in an offering may have up to 10% of their earnings withheld to the purchase of shares of common stock. The Board may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded.

The fair value of share option awards on the date of grant is determined using the Binomial model. No options were granted during the financial years ended 25 January 2015 and 31 January 2016.

Fair value of RSUs is determined using the closing trading price of common stock on the date of grant, minus a dividend yield discount.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***17. Share based payments (continued)**

The following table summarises the number and weighted average fair value of ESPP granted during the period:

	2016 US\$'000	2015 US\$'000
Number of shares issued under the plan to participating Nvidia Singapore Pte Ltd's employees on 31 January 2016 (25 January 2015)	<u>32,576</u>	<u>39,222</u>

The weighted average market price during the year ended 31 January 2016 was US\$22.21 (2015 US\$18.89) and the shares had an average grant date fair value of US\$16.10 (2015 US\$12.73).

The fair value of shares issued under the ESPP has been estimated at the date of grant with the following assumptions, using the Black-Scholes model:

	2016	2015
Weighted average expected life (years)	0.5-2.0	0.5-2.0
Risk free interest rate	0.1%-0.7%	0.1%-0.5%
Volatility	24%-34%	23%-31%
Dividend yield	<u>1.5%-1.8%</u>	<u>1.7%-1.9%</u>

Nvidia Corporation uses the implied volatility as it is expected to be more reflective of market conditions and, therefore, could reasonably be expected to be a better indicator of expected volatility than historical volatility. The risk-free interest rate is based upon observed interest rates on Treasury bills appropriate for the term of employee share options.

Dividend yield is based on history and expectation of dividend pay-outs. RSU awards are not eligible for cash dividends prior to vesting; therefore, the fair value of RSUs is discounted by dividend yield. For awards granted on or subsequent to 8 November 2012, Nvidia Corporation uses a dividend yield at grant date based on the per share dividends declared during the most recent quarter.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***17. Share based payments (continued)**

A reconciliation of share options and RSU movements for the financial periods ended 31 January, 2016 and 25 January, 2015 is shown below (average exercise price and fair value reported in US dollars):

Share-based Payment Award Activity

The following table summarises activity for share options:

	Number of share options	Weighted average exercise price
31 January 2016		
Outstanding at beginning of the year	79,176	\$14.28
Exercised*	(22,402)	\$12.90
Forfeited/Cancelled	(5,761)	\$14.23
Outstanding at end of the year	<u>51,013</u>	<u>\$14.90</u>
Options exercisable at year end	<u>40,245</u>	<u>\$15.02</u>

*The weighted average share price at the date of exercise of options exercised during the year ended 31 January 2016 was US\$22.50.

	Number of share options	Weighted average exercise price
25 January 2015		
Outstanding at beginning of the year	134,929	\$13.72
Exercised*	(55,003)	\$12.85
Forfeited/Cancelled	(750)	\$17.66
Outstanding at end of the year	<u>79,176</u>	<u>\$14.28</u>
Options exercisable at year end	<u>49,583</u>	<u>\$14.23</u>

*The weighted average share price at the date of exercise of options exercised during the year ended 25 January 2015 was US\$19.73.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***17. Share based payments (continued)****Range of exercise price details of awards outstanding as at 31 January 2016:**

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	30,854	6.36
US\$15.01-US\$20.00	20,159	5.32
	<u>51,013</u>	

Range of exercise price details of awards outstanding as at 25 January 2015:

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	51,272	5.85
US\$15.01-US\$20.00	27,904	5.10
	<u>79,176</u>	

Restricted Share Units ("RSUs") Activity

The following table summarises activity for restricted share units:

	Number of RSUs	Weighted average grant date fair value
31 January 2016		
Outstanding at beginning of the year	79,388	\$15.89
Granted	37,645	\$24.12
Vested	(26,852)	\$15.27
Forfeited/Cancelled	(11,783)	\$16.50
Outstanding/non-vested at end of the year	<u>78,398</u>	<u>\$19.96</u>

	Number of RSUs	Weighted average grant date fair value
25 January 2015		
Outstanding at beginning of the year	70,446	\$13.91
Granted	38,778	\$17.87
Vested	(28,765)	\$13.77
Forfeited/Cancelled	(1,071)	\$14.30
Outstanding/non-vested at end of the year	<u>79,388</u>	<u>\$15.89</u>

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***18. Commitments**Operating lease commitments

The future minimum lease payable under non-cancellable operating leases contracted for at the balance sheet date but not recognised as liabilities are as follows:

	31/01/2016 US\$'000	25/01/2015 US\$'000
Not later than one year	433	433
Later than one year but not later than five years	145	578
	<u>578</u>	<u>1,011</u>

19. Financial risk managementFinancial risk factors

The Company's activities expose it to market risk (including currency risk, interest rate risk and price risk), credit risk and liquidity risk.

The management team is responsible for setting the objectives and underlying principles of financial risk management for the Company, and establishes detailed policies such as risk identification and measurement, exposure limits and hedging strategies. Financial risk management is carried out by finance personnel.

The finance personnel measure actual exposures against the limits set and prepare regular reports for the review of the management team. The information presented below is based on information received by key management.

(a) Market risk**(i) Currency risk**

The Company's revenue, cost of operations and majority of the financial assets and liabilities are primarily in United States Dollar ("USD"). The Company is not exposed to any significant exchange rate risk. The Company does not purchase forward contracts to hedge this exposure.

(ii) Price risk

The Company has insignificant exposure to equity price risk as it does not hold any equity financial assets.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***19. Financial risk management (continued)****(a) Market risk (continued)****(iii) *Interest rate risk***

The Company is exposed to interest rate risk on its bank deposits. The bank deposits are mainly deposits in USD.

At 31 January 2016, if the USD interest rates had increased/decreased by 0.05% (2015: 0.05%) with all other variables including tax being constant, the profit after tax would have been higher/lower by US\$111,000 (2015: US\$33,000) as a result of higher/lower interest income on these deposits.

The Company has insignificant financial liabilities that are exposed to interest rate risks.

(b) Credit risk

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Company. The major classes of financial assets of the Company are cash and cash equivalents and trade receivables. Cash and cash equivalents are deposits in banks with sound credit ratings, therefore, the Company does not expect to have high credit risk in this regard. For trade receivables, the Company adopts the policy of dealing only with customers of appropriate credit history, and obtaining sufficient collateral where appropriate to mitigate credit risk. In addition, the Company monitors its credit risk on an ongoing basis by reviewing the debtors' aging to minimise its exposure to credit risk.

(i) *Financial assets that are neither past due nor impaired*

Trade receivables that are neither past due nor impaired are substantially companies with a good collection track record with the Company.

(ii) *There is no other class of financial assets that is past due and/or impaired except for trade receivables*

There is no financial asset that is past due and/or impaired.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***19. Financial risk management (continued)****(b) Credit risk (continued)**

- (ii) *There is no other class of financial assets that is past due and/or impaired except for trade receivables (continued)*

The carrying amount of trade receivables individually determined to be impaired and the movement in the related allowance for impairment are as follows:

	31/01/2016 US\$'000	25/01/2015 US\$'000
Gross amount	1,756	2,546
Less: Allowance for impairment	(1,756)	(2,546)
	-	-
Beginning of financial year	2,546	760
Allowance made/(utilised)	(790)	1,786
End of financial year (Note 9)	1,756	2,546

(c) Liquidity risk

The Company manage the liquidity risk by maintaining sufficient cash and bank balances to enable it to meet its operational requirements.

(d) Capital risk

The Company's objectives when managing capital are to ensure that the Company is adequately capitalised and to maintain an optimal capital structure.

The Company is not subject to any externally imposed capital requirements.

(e) Financial instruments by category

The carrying amounts of financial assets at fair value through profit or loss are disclosed on the face of the balance sheet. The aggregate carrying amounts of loans and receivables and financial liabilities at amortised cost are as follows:

	31/01/2016 2016 US\$'000	25/01/2015 2015 US\$'000
Loans and receivables	927,036	777,948
Financial liabilities at amortised cost	1,101,449	968,609

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***19. Financial risk management (continued)****(f) Offsetting financial assets and financial liabilities****(i) Financial assets**

The Company has the following financial instrument subject to enforceable master netting arrangement or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial assets	Gross amounts - financial liabilities	Net amounts - financial assets presented in the balance sheet	Financial assets	Net amount
	(a)	(b)	(c)=(a)-(b)	(d)	(e)=(c)+(d)
	US\$'000	US\$'000	US\$'000	US\$'000	US\$'000
As at 31 January 2016					
Trade and other receivables	203,518	17,801	185,717	91,991	277,708
Total	203,518	17,801	185,717	91,991	277,708
As at 25 January 2015					
Trade and other receivables	204,660	13,964	190,696	103,016	293,712
Total	204,660	13,964	190,696	103,016	293,712

(ii) Financial liabilities

The Company has the following financial instruments subject to enforceable master netting arrangements or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial liabilities	Gross amounts - financial assets	Net amounts - financial liabilities presented in the balance sheet	Financial liabilities	Net amount
	(a)	(b)	(c)=(a)-(b)	(d)	(e)=(c)+(d)
	US\$'000	US\$'000	US\$'000	US\$'000	US\$'000
As at 31 January 2016					
Trade and other payables	1,206,644	367,730	838,914	86,965	925,879
Total	1,206,644	367,730	838,914	86,965	925,879
As at 25 January 2015					
Trade and other payables	1,092,212	353,480	738,732	77,958	816,690
Total	1,092,212	353,480	738,732	77,958	816,690

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***20. Immediate and ultimate holding corporations**

The Company's immediate holding corporation is Nvidia International Inc., incorporated in the Cayman Islands. The Company's ultimate holding corporation is Nvidia Corporation, incorporated in United States of America.

21. Related party transactions

In addition to the information disclosed elsewhere in the financial statements, the following transactions took place between the Company and related parties at terms agreed between the parties:

	26/01/2015 to 31/01/2016 US\$'000	27/01/2014 to 25/01/2015 US\$'000
Purchases from immediate holding company	3,673,638	3,483,981
Intercompany services on marketing and administrative expenses paid and payable to other related corporations	<u>159,282</u>	<u>147,245</u>

The Company participates in the centralised cash pooling arrangement with Nvidia Corporation, its ultimate holding company. During the year, certain balances with related companies were settled and netted off through the cash pooling arrangement.

22. New or revised accounting standards and interpretations

The Company has not early adopted any mandatory standards, amendments and Interpretations to existing standards that have been published but are only effective for the Company's accounting periods beginning on or after 1 February 2016. However, management anticipates that the adoption of these standards, amendments and interpretations will not have a material impact on the financial statements of the Company in the period of their initial adoption.

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30

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 31 January 2016***23. Comparative figures**

In previous financial years, the Company has not recognised the expenses arising from share-based compensation in the financial statements. This has been corrected in the current financial year and comparative figures have been retrospectively adjusted, the financial statement line items affected are as follows:

Balance Sheet

	As previously reported US\$'000	As restated US\$'000	Impact US\$'000
As at 25 January 2015			
Retained earnings	32,898	24,117	(8,781)
Other reserves	-	8,781	8,781
As at 27 January 2014			
Retained earnings	29,273	21,036	(8,237)
Other reserves	-	8,237	8,237

Statement of comprehensive income

	As previously reported US\$'000	As restated US\$'000	Impact US\$'000
For the year ended 25 January 2015			
Employee compensation	6,250	6,794	544

24. Authorisation of financial statements

These financial statements were authorised for issue in accordance with a resolution of the Board of Directors of Nvidia Singapore Pte Ltd on

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Exhibit N

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NVIDIA SINGAPORE PTE LTD

(Incorporated in Singapore. Registration Number 200003831M)

FINANCIAL STATEMENT

For the financial year ended 29 January 2017



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NVIDIA SINGAPORE PTE LTD
(Incorporated in Singapore)

FINANCIAL STATEMENT
For the financial year ended 29 January 2017

Contents

	Page
Directors' Statement	1
Independent Auditor's Report	3
Statement of Comprehensive Income	5
Balance Sheet	6
Statement of Changes in Equity	7
Statement of Cash Flows	8
Notes to the Financial Statements	9



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NVIDIA SINGAPORE PTE LTD**DIRECTORS' STATEMENT***For the financial year ended 29 January 2017*

The directors present their report to the shareholder together with the audited financial statements for the financial year ended 29 January 2017.

In the opinion of the directors,

- (a) the financial statements as set out on pages 5 to 34 are drawn up so as to give a true and fair view of the financial position of the Company at 29 January 2017 and the financial performance, changes in equity and cash flows of the Company for the financial year covered by the financial statements; and
- (b) at the date of this statement, there are reasonable grounds to believe that the Company will be able to pay its debts as and when they fall due.

Directors

The directors in office at the date of this statement are as follows:

Lee Kay Beng
 Karen Theresa Burns
 Michael John Byron
 Rebecca Peters (appointed on 31 May 2016)

Arrangements to enable directors to acquire shares and debentures

Neither at the end of nor at any time during the financial year was the Company a party to any arrangement whose object was to enable the directors of the Company to acquire benefits by means of the acquisition of shares in, or debentures of, the Company or any other body corporate.

Directors' interests in shares and debentures

According to the register of directors' shareholdings, none of the directors holding office at the end of the financial year had any interest in the shares or debentures of the Company or its related corporations, except as follows:

	<u>Holdings registered in name of Director</u>	
	<u>At</u> 29.01.2017	<u>At</u> 01.02.2016
Ultimate Holding Corporation		
(No. of ordinary shares)		
-Nvidia Corporation		
Michael John Byron	37,390	20,575
Rebecca Peters*	468	-

- * Rebecca Peters was appointed on 31 May 2016. She held 468 ordinary shares in ultimate holding corporation as at that date.

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NVIDIA SINGAPORE PTE LTD**DIRECTORS' STATEMENT***For the financial year ended 29 January 2017***Directors' interests in shares and debentures (continued)**

	At 29.01.2017	At 01.02.2016
<u>(Unissued ordinary shares under share options)</u>		
-Nvidia Corporation		
Michael John Byron	11,126	23,713
Karen Theresa Burns	47,432	47,432
Rebecca Peters*	1,875	-
 <u>(Unvested restricted shares units)</u>		
-Nvidia Corporation		
Michael John Byron	121,302	119,432
Karen Theresa Burns	131,951	128,838
Rebecca Peters*	37,175	-

* Rebecca Peters was appointed on 31 May 2016. She held 3,872 unissued ordinary shares under share options and 33,344 unvested restricted shares units in ultimate holding corporation as at that date.

Share options

No options were granted during the financial year to subscribe for unissued shares of the Company.

No shares were issued during the financial year by virtue of the exercise of options to take up unissued shares of the Company.

There were no unissued shares of the Company under option at the end of the financial year.

Independent auditor

The independent auditor, PricewaterhouseCoopers LLP, has expressed its willingness to accept re-appointment.

On behalf of the directors


MICHAEL JOHN BYRON
Director

27 JUN 2017


KAREN THERESA BURNS
Director

June 27th 2017



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INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF NVIDIA SINGAPORE PTE LTD

Report on the Financial Statements

Our opinion

In our opinion, the accompanying financial statements of Nvidia Singapore Pte Ltd (the "Company") are properly drawn up in accordance with the provisions of the Companies Act, Chapter 50 (the "Act") and Financial Reporting Standards in Singapore ("FRSs") so as to give a true and fair view of the balance sheet of the Company as at 29 January 2017 and of the financial performance, changes in equity and cash flows of the Company for the year ended on that date.

What we have audited

The financial statements of the Company comprise:

- the balance sheet as at 29 January 2017;
- the statement of comprehensive income for the year then ended;
- the statement of changes in equity for the year then ended;
- the statement of cash flows for the year then ended; and
- the notes to the financial statements, including a summary of significant accounting policies.

Basis for Opinion

We conducted our audit in accordance with Singapore Standards on Auditing ("SSAs"). Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We are independent of the Company in accordance with the Accounting and Corporate Regulatory Authority ("ACRA") Code of Professional Conduct and Ethics for Public Accountants and Accounting Entities ("ACRA Code") together with the ethical requirements that are relevant to our audit of the financial statements in Singapore, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the ACRA Code.

Other Information

Management is responsible for the other information. The other information comprises the Directors' Statement included in pages 1 to 2 but does not include the financial statements and our auditor's report thereon.

Our opinion on the financial statements does not cover the other information and we do not and will not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information identified above and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated.

If, based on the work we have performed on the other information that we obtained prior to the date of this auditor's report, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of Management and Directors for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with the provisions of the Act and FRSs, and for devising and maintaining a system of internal accounting controls sufficient to provide a reasonable assurance that assets are safeguarded against loss from unauthorised use or disposition; and transactions are properly authorised and that they are recorded as necessary to permit the preparation of true and fair financial statements and to maintain accountability of assets. In preparing the financial statements, management is responsible for assessing the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Company or to cease operations, or has no realistic alternative but to do so.

The directors' responsibilities include overseeing the Company's financial reporting process.



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INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF NVIDIA SINGAPORE PTE LTD (continued)

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SSAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with SSAs, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on Other Legal and Regulatory Requirements

In our opinion, the accounting and other records required by the Act to be kept by the Company have been properly kept in accordance with the provisions of the Act.

PricewaterhouseCoopers W.

PricewaterhouseCoopers LLP
Public Accountants and Chartered Accountants
Singapore, 27 JUN 2017



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NVIDIA SINGAPORE PTE LTD**STATEMENT OF COMPREHENSIVE INCOME***For the financial year ended 29 January 2017*

	Note	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Revenue	4	5,712,400	4,077,896
Other income - net	4	59	134
Other (loss)/gain - net	5	(459)	4
Expenses			
- Raw materials and other consumables consumed		(5,515,265)	(3,896,460)
- Employee compensation	7	(7,606)	(7,356)
- Travelling expenses		(172)	(200)
- Sales and marketing expenses		(5,422)	(5,258)
- Depreciation of plant and equipment		(373)	(478)
- Intercompany service expenses		(173,322)	(159,282)
- Rental on operating leases		(438)	(439)
- Other operating expenses	6	(6,400)	(4,695)
Total expenses		(5,708,998)	(4,074,168)
Profit before income tax		3,002	3,866
Income tax expense	8	(543)	(843)
Net profit after tax/ Total comprehensive income		2,459	3,023

*The accompanying notes form an integral part of these financial statements.***Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**BALANCE SHEET***As at 29 January 2017*

	Note	29/01/2017 US\$'000	31/01/2016 US\$'000
ASSETS			
Current assets			
Cash and cash equivalents	9	99,408	223,210
Trade and other receivables	10	962,784	704,405
Inventories	11	340,657	208,883
Prepayment and deposits		4,795	1,052
		<u>1,407,644</u>	<u>1,137,550</u>
Non-current assets			
Plant and equipment	12	1,066	316
Investment in subsidiary	13	85	85
Loan to related party	14	500	500
		<u>1,651</u>	<u>901</u>
Total assets		<u>1,409,295</u>	<u>1,138,451</u>
LIABILITIES			
Current liabilities			
Trade and other payables	15	1,368,702	1,101,716
Current income tax liabilities	8	568	70
		<u>1,369,270</u>	<u>1,101,786</u>
Total liabilities		<u>1,369,270</u>	<u>1,101,786</u>
NET ASSETS		<u>40,025</u>	<u>36,665</u>
SHAREHOLDER'S EQUITY			
Share capital	16	1	1
Other reserves	17	10,425	9,524
Retained earnings		29,599	27,140
		<u>40,025</u>	<u>36,665</u>

The accompanying notes form an integral part of these financial statements.

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CHANGES IN EQUITY***For the financial year ended 29 January 2017*

	Share capital US\$'000	Other reserves US\$'000	Retained earnings US\$'000	Total equity US\$'000
2017				
Beginning of financial year	1	9,524	27,140	36,665
Share-based compensation	-	901	-	901
Total comprehensive income	-	-	2,459	2,459
End of financial year	1	10,425	29,599	40,025
2016				
Beginning of financial year - restated	1	8,781	24,117	32,899
Share-based compensation	-	743	-	743
Total comprehensive income	-	-	3,023	3,023
End of financial year	1	9,524	27,140	36,665

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CASH FLOWS***For the financial year ended 29 January 2017*

	Note	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Cash flows from operating activities			
Net profit after tax		2,459	3,023
Adjustments for:			
- Tax	8	543	843
- Depreciation of plant and equipment	12	373	478
- Share-based compensation		901	743
- Interest income		(68)	(119)
Operating cash flow before working capital changes		4,208	4,968
Change in operating assets and liabilities			
- Trade and other receivables		(258,379)	6,693
- Inventories		(131,774)	11,971
- Trade and other payables		266,986	132,849
- Prepayments and deposits		(3,743)	1,200
Cash (used in)/generated from operations		(122,702)	157,681
Income tax paid		(45)	(1,519)
Net cash (used in) /generated from operating activities		(122,747)	156,162
Cash flows from investing activities			
Additions of plant and equipment	12	(1,123)	(82)
Proceeds from disposal of plant and equipment		-	32
Interest received		68	119
Net cash (used in)/generated from investing activities		(1,055)	69
Net (decrease)/increase in cash and cash equivalents		(123,802)	156,231
Cash and cash equivalents at beginning of financial period		223,210	66,979
Cash and cash equivalents at end of financial period	9	99,408	223,210

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NVIDIA SINGAPORE PTE LTD

NOTES TO THE FINANCIAL STATEMENTS

For the financial year ended 29 January 2017

These notes form an integral part of and should be read in conjunction with the accompanying financial statements.

1. General information

The Company is incorporated in Singapore. The address of its registered office is 112 Robinson Road, #05-01, Singapore 068902.

The principal activity of the Company consists of sales of graphics processors and media and communication devices.

The principal activities of its subsidiary are to provide marketing services to Nvidia Singapore Pte Ltd.

2. Significant accounting policies

(a) Basis of preparation

The financial statements have been prepared in accordance with Singapore Financial Reporting Standards ("FRS") under the historical cost convention, except as disclosed in the accounting policies below.

The preparation of these financial statements in conformity with FRS requires management to exercise its judgement in the process of applying the Company's accounting policies. It also requires the use of certain critical accounting estimates and assumptions. The areas involving a higher degree of judgement or complexity, or areas where assumptions and estimates are significant to the financial statements are disclosed in Note 3.

Interpretations and amendments to published standards effective in 2016

On 01 February 2016, the Company adopted the new or amended FRS and Interpretations to FRS ("INT FRS") that are mandatory for application for the financial year. Changes to the Company's accounting policies have been made as required, in accordance with the relevant transitional provisions in the respective FRS and INT FRS.

The adoption of the above new or revised FRS did not result in any substantial changes to the Company's accounting policies nor any significant impact on these financial statements.



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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(b) Revenue recognition**

Revenue comprises the fair value of the consideration received or receivable for the sales of goods in the ordinary course of the Company's activities. Revenue is presented net of goods and services tax, rebates and discounts. Revenue is recognised as follows:

(1) *Sale of goods*

Revenue from sale of graphics processors and related media and communication devices is recognised when the Company has delivered the products to the customer, the customer has accepted the products and collectability of the related receivables is reasonably assured.

A sales return allowance for estimated product returns is established at the time revenue is recognised, based primarily on historical return rates.

(2) *Interest income*

Interest income is recognised using the effective interest method.

(c) Group accounting

These financial statements are the separate financial statements of Nvidia Singapore Pte Ltd. The Company is exempted from the preparation of consolidated financial statements as the Company is a wholly-owned subsidiary of Nvidia Corporation, a US-incorporated company which produces consolidated financial statements available for public use. The basis on which the subsidiary is accounted for is disclosed in Note 2(f). The main office of Nvidia Corporation is as follows: 2701 San Tomas Expressway, Santa Clara, CA 95050, U.S.A..

(d) Employee compensation**(1) *Defined contribution plans***

Defined contribution plans are post-employment benefit plans under which the Company pays fixed contributions into separate entities such as Mandatory Provident Fund and Superannuation Fund established in Hong Kong, on a mandatory, contractual or voluntary basis. The Company has no further payment obligations once the contributions have been paid. The Company's contribution to defined contribution plans are recognised as employee compensation expense when they are due.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(d) Employee compensation (continued)****(2) *Employee leave entitlements***

Employee entitlements to annual leave are recognised when they accrue to employees. A provision is made for the estimated liability for annual leave as a result of services rendered by employees up to the balance sheet date.

(3) *Share-based compensation*

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards under these plans include stock options, restricted share units ("RSUs") and employee stock purchase plan ("ESPP").

The Company accounts for share based payments in accordance with FRS 102 – Share based payments. Share based compensation expense is measured at the grant date of the related equity awards, based on the fair value of the awards, and the expense is recognised over the vesting period, with a corresponding increase in the other reserve.

In case of exchange of employees' services, the equity-settled payment is measured at the fair value of equity instruments granted to employees. If exercisable at the time of grant, equity-settled payment is included in relevant cost or expenses at fair value at grant date and capital surplus is increased accordingly; if exercisable after service in waiting period is completed or specified performance conditions are met, the service obtained in current period is included in relevant cost and expenses at fair value based on the best estimation on quantity of exercisable equity instruments made by the Company in accordance with latest changes in the number of exercisable employees and subsequent information such as whether specified performance conditions are met, and capital surplus is increased accordingly.

Stock options

The total amount to be recognised over the vesting period is determined by reference to the fair value of the options on the date of the grant.

The fair value of stock options is determined using option pricing model. The fair value of stock appreciation right is determined using Bimonial option pricing model.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(d) Employee compensation (continued)****(3) Share-based compensation (continued)****Stock options (continued)**

At the balance sheet date, subsequent information indicates that the number of equity instruments which are different with previous estimates should be adjusted to the exercisable number of equity instruments on the vesting date. After vesting date, no further adjustment will be raised for relevant cost (expense) or total owner's equity which has been recognised.

Stock options granted to employees, subject to certain exceptions, vest over a four year period, subject to continued service, with 25% vesting on the anniversary of the hire date in the case of new hires or the anniversary of the date of grant in the case of grants to existing employees and 6.25% vesting at the end of each quarterly period thereafter. Stock options granted under the 2007 Plan generally expire ten years from the date of grant.

Restricted Stock Units ("RSU")

RSUs granted to employees vest four years, subject to continued service, with 25% vesting on a pre-determined date that is close to the anniversary of the date of grant and for grants made prior to 18 May 2016, 12.5% vesting semi-annually thereafter until fully vested and for grants made after 18 May 2016, 6.25% vesting quarterly thereafter until fully vested. The total amount to be recognised over the vesting period is determined by reference to the fair value of the ultimate holding corporation stock on the date of the grant.

Employee Stock Purchase Plan ("ESPP")

Employees are also eligible to participate in an offering to have up to 10% of their earnings withheld up to certain limitations and applied on specified dates determined by the Board of Directors of Nvidia Corporation to the purchase of shares of common stock. The Board of Directors of Nvidia Corporation may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded. The employee benefit is recognised in profit or loss in the period in which the employees purchase the shares under common stock under the ESPP.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(e) Plant and equipment****(1) *Measurement***

Plant and equipment are recognised at cost and subsequently carried at cost less accumulated depreciation and accumulated impairment losses.

The cost of an item of plant and equipment initially recognised includes its purchase price and any cost that is directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. The projected cost of dismantlement, removal or restoration is recognised as part of the cost of plant and equipment if such obligation is incurred either when the item is acquired or as a consequence of using the asset during a particular period for purposes other than to produce inventories during that period.

(2) *Depreciation*

Depreciation on plant and equipment is calculated using the straight-line method to allocate their depreciable amounts over their estimated useful lives as follows:

	<u>Useful lives</u>
Machinery and equipment	3 - 5 years
Computer equipment	3 - 5 years
Office equipment	5 years
Furniture	5 years
Leasehold improvement	Lesser of estimated useful life or remaining lease term

The residual values, estimated useful lives and depreciation method of plant and equipment are reviewed, and adjusted as appropriate, at each balance sheet date. The effects of any revision are recognised in the statement of comprehensive income for the financial period in which the changes arise.

(3) *Subsequent expenditure*

Subsequent expenditure relating to plant and equipment that has already been recognised is added to the carrying amount of the asset only when it is probable that future economic benefits associated with the item, will flow to the Company and the cost can be reliably measured. All other repair and maintenance expense is recognised in the statement of comprehensive income when incurred.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(e) Plant and equipment (continued)****(4) *Disposal***

On disposal of an item of plant and equipment, the difference between the net disposal proceeds and its carrying amount is recognised in the statement of comprehensive income.

(f) Investment in subsidiary

Investment in subsidiary is carried at cost less accumulated impairment losses in the Company's balance sheet. On disposal of investment in subsidiary, the difference between disposal proceeds and the carrying amount of the investment is recognised in the statement of comprehensive income.

(g) Loan to related party

Loan to related party is initially recognised at fair value plus transaction costs and subsequently carried at amortised cost using the effective interest method, less accumulated impairment losses. The Company assesses at each balance sheet date whether there is objective evidence that this financial asset is impaired and recognises an allowance for impairment when such evidence exists.

(h) Impairment of non-financial assets

Plant and equipment and investment in subsidiary are tested for impairment whenever there is any objective evidence or indication that these assets may be impaired.

For the purpose of impairment testing, the recoverable amount (i.e. the higher of the fair value less cost to sell and value in use) is determined on an individual asset basis unless the asset does not generate cash flows that are largely independent of those from other assets. If this is the case, the recoverable amount is determined for the cash-generating unit (CGU) to which the asset belongs.

If the recoverable amount of the asset (or CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or CGU) is reduced to its recoverable amount. The difference between the carrying amount and recoverable amount is recognised in the statement of comprehensive income.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(h) Impairment of non-financial assets (continued)**

An impairment loss for an asset is reversed if, and only if, there has been a change in the estimates used to determine the assets' recoverable amount since the last impairment loss was recognised. The carrying amount of this asset is increased to its revised recoverable amount, provided that this amount does not exceed the carrying amount that would have been determined (net of any accumulated amortisation or depreciation) had no impairment loss been recognised for the asset in prior years. A reversal of impairment loss for an asset is recognised in profit or loss.

(i) Loans and receivables

Bank balances

Trade and other receivables

Bank balances, trade and other receivables are initially recognised at fair value plus transaction cost and subsequently carried at amortised cost using the effective interest method, less allowance for impairment.

The Company assesses at each balance sheet date whether there is objective evidence that these financial assets are impaired and recognises an allowance for impairment when such evidence exists.

The carrying amount of these assets is reduced through the use of an impairment allowance account which is calculated as the difference between the carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate.

These assets are presented as current assets except for those that are expected to be realised later than 12 months after the balance sheet date, which are presented as non-current assets.

(j) Trade and other payables

Trade and other payables represent liabilities for goods and services provided to the Company prior to the end of financial year which are unpaid. They are classified as current liabilities if payment is due within one year or less (or in the normal operating cycle of the business if longer). Otherwise, they are presented as non-current liabilities.

Trade and other payables are initially recognised at fair value and subsequently carried at amortised cost, using the effective interest method.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(k) Operating leases**

Leases of assets where substantially all risks and rewards incidental to ownership are retained by the lessor are classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) are recognised in profit or loss on a straight-line basis over the period of the lease.

When a lease is terminated before the lease period expires, any payment made by the Company as penalty is recognised as an expense in the period in which the termination takes place.

(l) Inventories

Inventories are carried at the lower of cost and net realisable value. Cost is determined using the first-in, first-out method. Net realisable value is the estimated selling price in the ordinary course of business, less applicable variable selling expenses.

(m) Income taxes

Current income tax for current and prior periods is recognised at the amount expected to be paid to or recovered from the tax authorities, using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date.

Deferred income tax is recognised for all temporary differences except when the deferred income tax arises from the initial recognition of an asset or liability that affects neither accounting nor taxable profit or loss at the time of the transaction.

Current and deferred income tax is measured using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date, and are recognised as income or expenses in profit or loss, except to the extent that the tax arises from a transaction which is recognised directly in equity.

(n) Provisions for other liabilities and charges

Provisions for other liabilities and charges are recognised when the Company has a present legal or constructive obligation as a result of past events, it is more likely than not that an outflow of resources will be required to settle the obligation and the amount has been reliably estimated.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***2. Significant accounting policies (continued)****(o) Currency translation**

The financial statements of the Company are presented in United States Dollars, which is the functional currency of the Company.

Transactions in a currency other than United States Dollar ("foreign currency") are translated into United States Dollar using the exchange rates prevailing at the dates of the transactions. Currency translation differences resulting from the settlement of such transactions and from the translation of monetary assets and liabilities denominated in foreign currencies at the closing rates at the balance sheet date are recognised in the statement of comprehensive income.

All other foreign exchange gains and losses impacting profit or loss are presented in the statement of comprehensive income within "other gains/losses".

(p) Cash and cash equivalents

For the purpose of presentation in the cash flow statement, cash and cash equivalents include cash on hand and deposits with financial institutions which are subject to an insignificant risk of change in value.

(q) Share capital

Ordinary shares are classified as equity.

3. Critical accounting estimates, assumptions and judgements

Estimates, assumptions and judgements are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances

Share-based payments

The Company is required to expense its employees' share-based compensation options and RSUs in accordance with FRS 102 "Share-based Payment". The Company measures share-based compensation cost based on the fair value on the grant date of each option and RSU. This cost is recognised over the period during which an employee is required to provide service in exchange for the award and option or the requisite service period, usually the vesting period, and it is adjusted for actual forfeitures that occur before vesting. In order to assess the fair value of share options, the Company is required to use certain assumptions, including the forfeitures and the service period of each employee. The use of different assumptions and estimates could produce materially different estimated fair values for the share-based compensation options and related expenses.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***4. Income**

	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Revenue		
Sale of graphics processors and related media and communication devices	5,712,400	4,077,896
Other income – net:		
Interest income	68	119
Others	(9)	15
	<u>5,712,459</u>	<u>4,078,030</u>

5. Other (loss)/gain – net

	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Exchange (loss)/gain - net	<u>(459)</u>	<u>4</u>

6. Other operating expenses

	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Consulting and professional expense	2,157	1,344
Utilities expense	94	104
Repair and maintenance expense	390	283
Bank charges	71	117
Bad debt expense/(reversal)	541	157
Insurance for credit	1,249	1,180
Engineering and testing expense	1,500	713
Restructuring expense	-	340
Other expenses	398	457
Total	<u>6,400</u>	<u>4,695</u>

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***7. Employee compensation**

	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Wages and salaries	6,162	6,134
Employer's contribution to defined contribution plans	543	479
Share-based compensation	901	743
	<u>7,606</u>	<u>7,356</u>

The key management is directors of the Company and there is no key management personnel remuneration during the financial year (2016: US\$Nil).

8. Income tax**(a) Income tax expense**

	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Income tax expense attributable to profit is made up of:		
- Current income tax	<u>543</u>	<u>843</u>

The tax expense on profit differs from the amount that would arise using the Singapore standard rate of income tax as explained below:

	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Profit before tax	<u>3,002</u>	<u>3,866</u>
Tax calculated at a tax rate of 17% (2016: 17%)	510	657
Effects of:		
- Expenses not deductible for tax purposes	246	207
- Income not subject to tax	(14)	(22)
- Write off of bad debts	-	(156)
- Different tax rates in other country	(15)	(19)
- Others	(184)	176
Tax charge	<u>543</u>	<u>843</u>

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 29 January 2017

8. Income tax (continued)

(b) Movements in current tax liabilities

	29/01/2017 US\$'000	31/01/2016 US\$'000
Beginning of financial year	70	746
Tax expense on profit - current financial year	543	843
Income tax paid	(45)	(1,519)
End of the financial year	<u>568</u>	<u>70</u>

9. Cash and cash equivalents

	29/01/2017 US\$'000	31/01/2016 US\$'000
Cash at bank	<u>99,408</u>	<u>223,210</u>

10. Trade and other receivables

	29/01/2017 US\$'000	31/01/2016 US\$'000
Trade receivables:		
- Immediate holding company	53	48
- Non-related parties	708,093	427,874
- Other related companies	28	-
Less: Allowance for impairment of receivables		
- Non-related parties	(2,297)	(1,756)
Trade receivables - net	<u>705,877</u>	<u>426,166</u>
Non-trade receivables:		
- Immediate holding company	173,486	185,717
- Other related companies	82,256	91,943
	<u>255,742</u>	<u>277,660</u>
Other receivables	<u>1,165</u>	<u>579</u>
	<u>962,784</u>	<u>704,405</u>

The non-trade receivables due from immediate holding company and other related companies are unsecured, interest-free and are repayable on demand.



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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 29 January 2017

11. Inventories

	29/01/2017 US\$'000	31/01/2016 US\$'000
Finished goods	340,657	208,883

12. Plant and equipment

	Computer equipment US\$'000	Machinery and equipment US\$'000	Office equipment US\$'000	Furniture US\$'000	Leasehold improvement US\$'000	Total US\$'000
2017						
<u>Cost</u>						
Beginning of financial year	521	322	28	26	202	1,099
Additions	88	996	-	-	39	1,123
Disposals	(456)	(282)	(5)	-	-	(743)
End of financial year	153	1,036	23	26	241	1,479
<u>Accumulated depreciation</u>						
Beginning of financial year	360	257	11	18	137	783
Depreciation charge	139	160	4	5	65	373
Disposals	(456)	(282)	(5)	-	-	(743)
End of financial year	43	135	10	23	202	413
Net book value						
End of financial year	110	901	13	3	39	1,066

	Computer equipment US\$'000	Machinery and equipment US\$'000	Office equipment US\$'000	Furniture US\$'000	Leasehold improvement US\$'000	Total US\$'000
2016						
<u>Cost</u>						
Beginning of financial year	866	1,522	28	26	197	2,639
Additions	65	12	-	-	5	82
Disposals	(410)	(1,212)	-	-	-	(1,622)
End of financial year	521	322	28	26	202	1,099
<u>Accumulated depreciation</u>						
Beginning of financial year	499	1,286	5	13	92	1,895
Depreciation charge	239	183	6	5	45	478
Disposals	(378)	(1,212)	-	-	-	(1,590)
End of financial year	360	257	11	18	137	783
Net book value						
End of financial year	161	65	17	8	65	316



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24 May 2020

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***13. Investment in subsidiary**

	29/01/2017 US\$'000	31/01/2016 US\$'000
Unquoted equity shares at cost	<u>85</u>	<u>85</u>

Details of investment in subsidiary are as follows:

Name of company	Principal activities	Country of incorporation	Equity holding		Cost of investment	
			29/01/2017 %	31/01/2016 %	29/01/2017 US\$'000	31/01/2016 US\$'000
NVIDIA GK	Provide marketing services to Nvidia Singapore Pte Ltd	Japan	100	100	<u>85</u>	<u>85</u>

The subsidiary does not require an audit in accordance with the laws in the country of its incorporation.

14. Loan to related party

The loan to Nvidia Brazil is unsecured, denominated in the United States Dollar and is due in full on 7 August 2023. The contractual interest rate on the loan at balance sheet date is 3.0% (2016: 3.0%) per annum. The carrying amount of the loan approximate its fair value.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***15. Trade and other payables**

	29/01/2017 US\$'000	31/01/2016 US\$'000
Trade payables		
- Immediate holding company	1,091,874	864,103
	<u>1,091,874</u>	<u>864,103</u>
Non-trade payables		
- Immediate holding company	4,218	4,119
- Other related companies	71,616	57,657
	<u>75,834</u>	<u>61,776</u>
Accrued operating expenses	196,613	169,729
Other payables	4,381	6,108
	<u>200,994</u>	<u>175,837</u>
	<u>1,368,702</u>	<u>1,101,716</u>

The non-trade payables to immediate holding company and other related companies are unsecured, interest-free and are repayable on demand.

16. Share capital

The Company's share capital comprise fully paid-up 2 (2016: 2) ordinary shares with no par value, amounting to a total of US\$1,000 (2016: US\$1,000).

17. Other reserves

	29/01/2017 US\$'000	31/01/2016 US\$'000
Beginning of financial year	9,524	8,781
Employee share-based payment scheme		
- Value of employee services	901	743
End of financial year	<u>10,425</u>	<u>9,524</u>

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24 May 2020

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***18. Share based payments**

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards include share options, restricted share units ("RSUs"), and employee share purchase plan ("ESPP"), are granted under the following plans:

Amended and Restated 2007 Equity Incentive Plan

The Nvidia Corporation 2007 Equity Incentive Plan was approved in 2007, and subsequently amended and restated in 2012, 2013 and 2014, or the Restated 2007 Plan. This plan authorizes the issuance of share options and restricted share units.

Share options granted to employees, subject to certain exceptions, vest over a four year period subject to continued service, and generally expire ten years from the date of grant.

Subject to certain exceptions, RSUs granted to employees vest over a four year period, subject to continued service.

1998 and 2012 Employee Share Purchase Plan

The Nvidia Corporation 2012 Employee Share Purchase Plan was approved in 2012, and subsequently amended and restated in 2014, or the Restated 2012 Plan, as the successor to the 1998 Employee Share Purchase Plan.

Employees who participate in an offering may have up to 10% of their earnings withheld to the purchase of shares of common stock. The Board may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded.

The fair value of share option awards on the date of grant is determined using the Binomial model.

Fair value of RSUs is determined using the closing trading price of common stock on the date of grant, minus a dividend yield discount.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***18. Share based payments (continued)**

The following table summarises the number and weighted average fair value of ESPP granted during the period:

	2017	2016
Number of shares issued under the plan to participating Nvidia Singapore Pte Ltd's employees on 29 January 2017 (31 January 2016)	<u>24,694</u>	<u>32,576</u>

The weighted average market price during the year ended 29 January 2017 was US\$46.57(2016: US\$22.21) and the shares had an average grant date fair value of US\$21.66 (2016: US\$16.10).

The fair value of shares issued under the ESPP has been estimated at the date of grant with the following assumptions, using the Black-Scholes model:

	2017	2016
Weighted average expected life (years)	0.5-2.0	0.5-2.0
Risk free interest rate	0.5%-0.9%	0.1%-0.7%
Volatility	30%-39%	24%-34%
Dividend yield	<u>0.7%-1.4%</u>	<u>1.5%-1.8%</u>

Nvidia Corporation uses the implied volatility as it is expected to be more reflective of market conditions and, therefore, could reasonably be expected to be a better indicator of expected volatility than historical volatility. The risk-free interest rate is based upon observed interest rates on Treasury bills appropriate for the term of employee share options.

Dividend yield is based on history and expectation of dividend pay-outs. RSU awards are not eligible for cash dividends prior to vesting; therefore, the fair value of RSUs is discounted by dividend yield. For awards granted on or subsequent to 8 November 2012, Nvidia Corporation uses a dividend yield at grant date based on the per share dividends declared during the most recent quarter.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***18. Share based payments (continued)**

A reconciliation of share options and RSU movements for the financial periods ended 29 January 2017 and 31 January 2016 is shown below (average exercise price and fair value reported in US dollars):

Share-based Payment Award Activity

The following table summarises activity for share options:

	Number of share options	Weighted average exercise price
29 January 2017		
Outstanding at beginning of the year	51,013	\$14.90
Exercised*	(17,144)	\$15.41
Outstanding at end of the year	33,869	\$14.64
Options exercisable at year end	31,036	\$14.59

*The weighted average share price at the date of exercise of options exercised during the year ended 29 January 2017 was US\$47.04. No options were granted during the financial years ended 29 January 2017.

	Number of share options	Weighted average exercise price
31 January 2016		
Outstanding at beginning of the year	79,176	\$14.28
Exercised*	(22,402)	\$12.90
Forfeited/Cancelled	(5,761)	\$14.23
Outstanding at end of the year	51,013	\$14.90
Options exercisable at year end	40,245	\$15.02

*The weighted average share price at the date of exercise of options exercised during the year ended 31 January 2016 was US\$22.50. No options were granted during the financial years ended 31 January 2016.

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24 May 2020

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 29 January 2017

18. Share based payments (continued)

Range of exercise price details of awards outstanding as at 29 January 2017:

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	22,917	5.52
US\$15.01-US\$20.00	10,952	5.43
	<u>33,869</u>	

Range of exercise price details of awards outstanding as at 31 January 2016:

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	30,854	6.36
US\$15.01-US\$20.00	20,159	5.32
	<u>51,013</u>	

Restricted Share Units ("RSUs") Activity

The following table summarises activity for restricted share units:

	Number of RSUs	Weighted average grant date fair value
29 January 2017		
Outstanding at beginning of the year	78,398	\$19.96
Granted	17,790	\$57.71
Vested	(28,630)	\$18.21
Forfeited/Cancelled	(393)	\$13.98
Outstanding/non-vested at end of the year	<u>67,165</u>	<u>\$30.77</u>
	Number of RSUs	Weighted average grant date fair value
31 January 2016		
Outstanding at beginning of the year	79,388	\$15.89
Granted	37,645	\$24.12
Vested	(26,852)	\$15.27
Forfeited/Cancelled	(11,783)	\$16.50
Outstanding/non-vested at end of the year	<u>78,398</u>	<u>\$19.96</u>



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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***19. Commitments**Operating lease commitments

The future minimum lease payable under non-cancellable operating leases contracted for at the balance sheet date but not recognised as liabilities are as follows:

	29/01/2017 US\$'000	31/01/2016 US\$'000
Not later than one year	144	433
Later than one year but not later than five years	-	145
	<u>144</u>	<u>578</u>

20. Financial risk managementFinancial risk factors

The Company's activities expose it to market risk (including currency risk, price risk and interest rate), credit risk and liquidity risk.

The management team is responsible for setting the objectives and underlying principles of financial risk management for the Company, and establishes detailed policies such as risk identification and measurement, exposure limits and hedging strategies. Financial risk management is carried out by finance personnel.

The finance personnel measure actual exposures against the limits set and prepare regular reports for the review of the management team. The information presented below is based on information received by key management.

(a) Market risk**(i) Currency risk**

The Company's revenue, cost of operations and majority of the financial assets and liabilities are primarily in United States Dollar ("USD"). The Company is not exposed to any significant currency risk. The Company did not enter into currency forward contracts to hedge this exposure.

(ii) Price risk

The Company has insignificant exposure to equity price risk as it does not hold any equity financial assets.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***20. Financial risk management (continued)****(a) Market risk (continued)****(iii) *Interest rate risk***

The Company is exposed to interest rate risk on its bank deposits. The bank deposits are mainly deposits in USD.

At 29 January 2017, if the USD interest rates had increased/decreased by 0.05% (2016: 0.05%) with all other variables including tax being constant, the profit after tax would have been higher/lower by US\$49,000 (2016: US\$111,000) as a result of higher/lower interest income on these deposits.

The Company has insignificant financial liabilities that are exposed to interest rate risks.

(b) Credit risk

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Company. The major classes of financial assets of the Company are cash and cash equivalents and trade receivables. Cash and cash equivalents are deposits in banks with sound credit ratings, therefore, the Company does not expect to have high credit risk in this regard.

For trade receivables, the Company adopts the policy of dealing only with customers of appropriate credit history, and obtaining sufficient collateral where appropriate to mitigate credit risk. In addition, the Company monitors its credit risk on an ongoing basis by reviewing the debtors' aging to minimise its exposure to credit risk.

Credit exposure to an individual customer is restricted by the credit limit approved by the credit controller. Customers' payment profile and credit exposure are continuously monitored by the credit controller and reported to the management and Board of Directors. The Company's trade receivables include 5 debtors (2016: 5 debtors) that represented 42.3% and 39.0% of trade receivables at balance sheet date, respectively.

(i) *Financial assets that are neither past due nor impaired*

Trade receivables that are neither past due nor impaired are substantially companies with a good collection track record with the Company.

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24 May 2020

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***20. Financial risk management (continued)****(b) Credit risk (continued)****(ii) Financial assets that are past due and/or impaired**

There is no other class of financial assets that is past due and/or impaired except for trade receivables.

The carrying amount of trade receivables individually determined to be impaired and the movement in the related allowance for impairment are as follows:

	29/01/2017 US\$'000	31/01/2016 US\$'000
Gross amount	2,297	1,756
Less: Allowance for impairment	(2,297)	(1,756)
	-	-
Beginning of financial year	1,756	2,546
Allowance made/(utilised)	541	(790)
End of financial year (Note 10)	2,297	1,756

(c) Liquidity risk

The Company manage the liquidity risk by maintaining sufficient cash and bank balances to enable it to meet its operational requirements.

(d) Capital risk

The Company's objectives when managing capital are to ensure that the Company is adequately capitalised and to maintain an optimal capital structure.

The Company is not subject to any externally imposed capital requirements.

(e) Financial instruments by category

The carrying amounts of financial assets measured at fair value through profit or loss are disclosed on the face of the balance sheet. The aggregate carrying amounts of loans and receivables and financial liabilities at amortised cost are as follows:

	29/01/2017 US\$'000	31/01/2016 US\$'000
Loans and receivables	1,061,617	927,036
Financial liabilities at amortised cost	1,368,428	1,101,449

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***20. Financial risk management (continued)****(f) Offsetting financial assets and financial liabilities****(i) Financial assets**

The Company has the following financial instrument subject to enforceable master netting arrangement or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial assets (a) US\$'000	Gross amounts - financial liabilities (b) US\$'000	Net amounts - financial assets presented in the balance sheet (c)=(a)-(b) US\$'000	Financial assets (d) US\$'000	Net amount (e)=(c)+(d) US\$'000
As at 29 January 2017					
Trade and other receivables	209,731	36,245	173,486	82,337	255,823
Total	209,731	36,245	173,486	82,337	255,823
As at 31 January 2016					
Trade and other receivables	203,518	17,801	185,717	91,991	277,708
Total	203,518	17,801	185,717	91,991	277,708

(ii) Financial liabilities

The Company has the following financial instruments subject to enforceable master netting arrangements or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial liabilities (a) US\$'000	Gross amounts - financial assets (b) US\$'000	Net amounts - financial liabilities presented in the balance sheet (c)=(a)-(b) US\$'000	Financial liabilities (d) US\$'000	Net amount (e)=(c)+(d) US\$'000
As at 29 January 2017					
Trade and other payables	1,034,886	389,421	645,465	522,243	1,167,708
Total	1,034,886	389,421	645,465	522,243	1,167,708
As at 31 January 2016					
Trade and other payables	1,206,644	367,730	838,914	86,965	925,879
Total	1,206,644	367,730	838,914	86,965	925,879

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***21. Immediate and ultimate holding corporations**

The Company's immediate holding corporation is Nvidia International Inc., incorporated in the Cayman Islands. The Company's ultimate holding corporation is Nvidia Corporation, incorporated in United States of America.

22. Related party transactions

In addition to the information disclosed elsewhere in the financial statements, the following transactions took place between the Company and related parties at terms agreed between the parties:

	01/02/2016 to 29/01/2017 US\$'000	26/01/2015 to 31/01/2016 US\$'000
Purchases from immediate holding company	5,049,758	3,673,638
Payments made on behalf of a fellow subsidiary	381	25
Sales of goods to a fellow subsidiary	28	-
Sales of goods to immediate holding company	5	-
Intercompany expense on marketing and administrative services	173,322	159,282

The Company participates in the centralised cash pooling arrangement with Nvidia Corporation, its ultimate holding company. During the year, certain balances with related companies were settled and netted off through the cash pooling arrangement.

23. New or revised accounting standards and interpretations

Below are the mandatory standards, amendments and interpretations to existing standards that have been published, and are relevant for the Group's accounting periods beginning on or after 30 January 2017 and which the Group has not early adopted:

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 29 January 2017***23. New or revised accounting standards and interpretations (continued)**

- FRS 115 Revenue from contracts with customers (effective for annual periods beginning on or after 1 January 2018)

This is the converged standard on revenue recognition. It replaces FRS 11 Construction contracts, FRS 18 Revenue, and related interpretations. Revenue is recognised when a customer obtains control of a good or service. A customer obtains control when it has the ability to direct the use of and obtain the benefits from the good or service. The core principle of FRS 115 is that an entity recognises revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. An entity recognises revenue in accordance with that core principle by applying the following steps:

- Step 1: Identify the contract(s) with a customer
- Step 2: Identify the performance obligations in the contract
- Step 3: Determine the transaction price
- Step 4: Allocate the transaction price to the performance obligations in the contract
- Step 5: Recognise revenue when (or as) the entity satisfies a performance obligation

FRS 115 also includes a cohesive set of disclosure requirements that will result in an entity providing users of financial statements with comprehensive information about the nature, amount, timing and uncertainty of revenue and cash flows arising from the entity's contracts with customers.

Management is currently assessing the effects of applying the new standard on the Company's financial statements and has identified the following areas that are likely to be affected:

- Rights of return – FRS 115 requires separate presentation on the balance sheet of the right to recover the goods from the customer and the refund obligation; and
- Accounting for certain costs incurred in fulfilling a contract – certain costs which are currently expensed may need to be recognised as an asset under FRS 115.

At this stage, the Company is not able to estimate the impact of the new rules on the Company's financial statements. The Company will make more detailed assessment of the impact over the next twelve months.

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 29 January 2017

23. New or revised accounting standards and interpretations (continued)

- FRS 116 Leases (effective for annual periods beginning on or after 1 January 2019)

FRS 116 will result in almost all leases being recognised on the balance sheet, as the distinction between operating and finance leases is removed. Under the new standard, an asset (the right to use the leased item) and a financial liability to pay rentals are recognised. The only exceptions are short-term and low-value leases. The accounting for lessors will not change significantly.

The standard will affect primarily the accounting for the Company's operating leases. As at the balance sheet date, the Company has non-cancellable operating lease commitments of US\$144,000 (Note 19). As at the reporting date, the Company has non-cancellable operating lease commitments of US\$144,000. However, the Company has yet to determine to what extent these commitments will result in the recognition of an asset and a liability for future payments and how this will affect the Company's profit and classification of cash flows.

Some of the commitments may be covered by the exception for short-term and low-value leases and some commitments may relate to arrangements that will not qualify as leases under FRS 116.

24. Authorisation of financial statements

These financial statements were authorised for issue in accordance with a resolution of the Board of Directors of Nvidia Singapore Pte Ltd on 27 JUN 2017



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Exhibit O

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NVIDIA SINGAPORE PTE LTD

(Incorporated in Singapore. Registration Number 200003831M)

FINANCIAL STATEMENT

For the financial year ended 28 January 2018



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NVIDIA SINGAPORE PTE LTD

(Incorporated in Singapore)

FINANCIAL STATEMENT

For the financial year ended 28 January 2018

Contents

	Page
Directors' Statement	1
Independent Auditor's Report	3
Statement of Comprehensive Income	5
Balance Sheet	6
Statement of Changes in Equity	7
Statement of Cash Flows	8
Notes to the Financial Statements	9



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NVIDIA SINGAPORE PTE LTD**DIRECTORS' STATEMENT***For the financial year ended 28 January 2018*

The directors present their report to the shareholder together with the audited financial statements for the financial year ended 28 January 2018.

In the opinion of the directors,

- (a) the financial statements as set out on pages 5 to 35 are drawn up so as to give a true and fair view of the financial position of the Company at 28 January 2018 and the financial performance, changes in equity and cash flows of the Company for the financial year covered by the financial statements; and
- (b) at the date of this statement, there are reasonable grounds to believe that the Company will be able to pay its debts as and when they fall due.

Directors

The directors in office at the date of this statement are as follows:

Lee Kay Beng
Karen Theresa Burns
Michael John Byron
Rebecca Peters

Arrangements to enable directors to acquire shares and debentures

Neither at the end of nor at any time during the financial year was the Company a party to any arrangement whose object was to enable the directors of the Company to acquire benefits by means of the acquisition of shares in, or debentures of, the Company or any other body corporate.

Directors' interests in shares and debentures

According to the register of directors' shareholdings, none of the directors holding office at the end of the financial year had any interest in the shares or debentures of the Company or its related corporations, except as follows:

	Holdings registered in	
	<u>name of Director</u>	
	At	At
	28.01.2018	29.01.2017
Ultimate Holding Corporation		
(No. of ordinary shares)		
-Nvidia Corporation		
Michael John Byron	28,945	37,390
Rebecca Peters	1,974	468

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NVIDIA SINGAPORE PTE LTD**DIRECTORS' STATEMENT***For the financial year ended 28 January 2018***Directors' interests in shares and debentures (continued)**

	At 28.01.2018	At 29.01.2017
<u>(Unissued ordinary shares under share options)</u>		
-Nvidia Corporation		
Michael John Byron	9,018	11,126
Karen Theresa Burns	31,275	47,432
Rebecca Peters	1,875	1,875
<u>(Unvested restricted shares units)</u>		
-Nvidia Corporation		
Michael John Byron	84,858	121,302
Karen Theresa Burns	93,151	131,951
Rebecca Peters	27,091	37,175

Share options

No options were granted during the financial year to subscribe for unissued shares of the Company.

No shares were issued during the financial year by virtue of the exercise of options to take up unissued shares of the Company.

There were no unissued shares of the Company under option at the end of the financial year.

Independent auditor

The independent auditor, PricewaterhouseCoopers LLP, has expressed its willingness to accept re-appointment.

On behalf of the directors

June 12th 2018



MICHAEL JOHN BYRON
Director



KAREN THERESA BURNS
Director



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24 May 2020

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INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF NVIDIA SINGAPORE PTE LTD

Report on the Financial Statements

Our opinion

In our opinion, the accompanying financial statements of Nvidia Singapore Pte Ltd (the "Company") are properly drawn up in accordance with the provisions of the Companies Act, Chapter 50 (the "Act") and Financial Reporting Standards in Singapore ("FRSs") so as to give a true and fair view of the balance sheet of the Company as at 28 January 2018 and of the financial performance, changes in equity and cash flows of the Company for the year ended on that date.

What we have audited

The financial statements of the Company comprise:

- the balance sheet as at 28 January 2018;
- the statement of comprehensive income for the year then ended;
- the statement of changes in equity for the year then ended;
- the statement of cash flows for the year then ended; and
- the notes to the financial statements, including a summary of significant accounting policies.

Basis for Opinion

We conducted our audit in accordance with Singapore Standards on Auditing ("SSAs"). Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We are independent of the Company in accordance with the Accounting and Corporate Regulatory Authority Code of Professional Conduct and Ethics for Public Accountants and Accounting Entities ("ACRA Code") together with the ethical requirements that are relevant to our audit of the financial statements in Singapore, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the ACRA Code.

Other Information

Management is responsible for the other information. The other information comprises the Directors' Statement but does not include the financial statements and our auditor's report thereon.

Our opinion on the financial statements does not cover the other information and we do not and will not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of Management and Directors for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with the provisions of the Act and FRSs, and for devising and maintaining a system of internal accounting controls sufficient to provide a reasonable assurance that assets are safeguarded against loss from unauthorised use or disposition; and transactions are properly authorised and that they are recorded as necessary to permit the preparation of true and fair financial statements and to maintain accountability of assets.

In preparing the financial statements, management is responsible for assessing the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Company or to cease operations, or has no realistic alternative but to do so.

The directors' responsibilities include overseeing the Company's financial reporting process.



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**INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF
NVIDIA SINGAPORE PTE LTD (continued)**

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SSAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

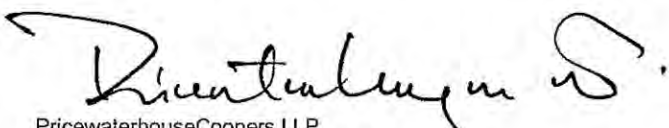
As part of an audit in accordance with SSAs, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on Other Legal and Regulatory Requirements

In our opinion, the accounting and other records required by the Act to be kept by the Company have been properly kept in accordance with the provisions of the Act.


PricewaterhouseCoopers LLP
Public Accountants and Chartered Accountants
Singapore,

12 JUN 2018



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NVIDIA SINGAPORE PTE LTD**STATEMENT OF COMPREHENSIVE INCOME***For the financial year ended 28 January 2018*

	Note	30/01/2017 to 28/01/2018 US\$'000	01/02/2016 to 29/01/2017 US\$'000
Revenue	4	8,064,722	5,712,400
Other income - net	4	96	59
Other losses - net	5	(490)	(459)
Expenses			
- Raw materials and other consumables consumed		(7,830,208)	(5,515,265)
- Employee compensation	7	(9,043)	(7,606)
- Travelling expenses		(237)	(172)
- Sales and marketing expenses		(4,063)	(5,422)
- Depreciation of property, plant and equipment		(319)	(373)
- Intercompany service expenses		(210,571)	(173,322)
- Rental on operating leases		(511)	(438)
- Other operating expenses	6	(6,789)	(6,400)
Total expenses		(8,061,741)	(5,708,998)
Profit before income tax		2,587	3,002
Income tax expense	8	(790)	(543)
Net profit after tax/ Total comprehensive income		1,797	2,459

The accompanying notes form an integral part of these financial statements.**Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**BALANCE SHEET***As at 28 January 2018*

	Note	28/01/2018 US\$'000	29/01/2017 US\$'000
ASSETS			
Current assets			
Cash and cash equivalents	9	7,509	99,408
Trade and other receivables	10	1,130,755	962,784
Inventories	11	335,435	340,657
Prepayment and deposits		4,619	4,795
		<u>1,478,318</u>	<u>1,407,644</u>
Non-current assets			
Property, plant and equipment	12	845	1,066
Investment in subsidiary	13	85	85
Loan to related party	14	-	500
		<u>930</u>	<u>1,651</u>
Total assets		<u>1,479,248</u>	<u>1,409,295</u>
LIABILITIES			
Current liabilities			
Trade and other payables	15	1,434,950	1,368,702
Current income tax liabilities	8	781	568
		<u>1,435,731</u>	<u>1,369,270</u>
Total liabilities		<u>1,435,731</u>	<u>1,369,270</u>
NET ASSETS		<u>43,517</u>	<u>40,025</u>
SHAREHOLDER'S EQUITY			
Share capital	16	1	1
Other reserves	17	12,120	10,425
Retained earnings		31,396	29,599
		<u>43,517</u>	<u>40,025</u>

The accompanying notes form an integral part of these financial statements.**Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CHANGES IN EQUITY***For the financial year ended 28 January 2018*

	Share capital US\$'000	Other reserves US\$'000	Retained earnings US\$'000	Total equity US\$'000
2018				
Beginning of financial year	1	10,425	29,599	40,025
Share-based compensation	-	1,695	-	1,695
Total comprehensive income	-	-	1,797	1,797
End of financial year	1	12,120	31,396	43,517
2017				
Beginning of financial year	1	9,524	27,140	36,665
Share-based compensation	-	901	-	901
Total comprehensive income	-	-	2,459	2,459
End of financial year	1	10,425	29,599	40,025

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NVIDIA SINGAPORE PTE LTD**STATEMENT OF CASH FLOWS***For the financial year ended 28 January 2018*

	Note	30/01/2017 to 28/01/2018 US\$'000	01/02/2016 to 29/01/2017 US\$'000
Cash flows from operating activities			
Net profit after tax		1,797	2,459
Adjustments for:			
- Tax	8	790	543
- Depreciation of property, plant and equipment	12	319	373
- Share-based compensation	7	1,695	901
- Interest income	4	-	(68)
Operating cash flow before working capital changes		4,601	4,208
Change in operating assets and liabilities			
- Trade and other receivables		(167,971)	(258,379)
- Inventories		5,222	(131,774)
- Trade and other payables		66,248	266,986
- Prepayments and deposits		176	(3,743)
Cash used in operations		(91,724)	(122,702)
Income tax paid	8	(577)	(45)
Net cash used in operating activities		(92,301)	(122,747)
Cash flows from investing activities			
Additions of property, plant and equipment	12	(98)	(1,123)
Repayment of loan to related party	14	500	-
Interest received		-	68
Net cash generated/(used in) from investing activities		402	(1,055)
Net decrease in cash and cash equivalents		(91,899)	(123,802)
Cash and cash equivalents at beginning of financial period		99,408	223,210
Cash and cash equivalents at end of financial period	9	7,509	99,408

The accompanying notes form an integral part of these financial statements.**Certified True Copy**

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NVIDIA SINGAPORE PTE LTD**NOTES TO THE FINANCIAL STATEMENTS***For the financial year ended 28 January 2018*

These notes form an integral part of and should be read in conjunction with the accompanying financial statements.

1. General information

The Company is incorporated in Singapore. The address of its registered office is 112 Robinson Road, #05-01, Singapore 068902.

The principal activity of the Company consists of sales of graphics processors and media and communication devices.

The principal activities of its subsidiary are to provide marketing services to Nvidia Singapore Pte Ltd.

2. Significant accounting policies**(a) Basis of preparation**

The financial statements have been prepared in accordance with Singapore Financial Reporting Standards ("FRS") under the historical cost convention, except as disclosed in the accounting policies below.

The preparation of these financial statements in conformity with FRS requires management to exercise its judgement in the process of applying the Company's accounting policies. It also requires the use of certain critical accounting estimates and assumptions. The areas involving a higher degree of judgement or complexity, or areas where assumptions and estimates are significant to the financial statements are disclosed in Note 3.

Interpretations and amendments to published standards effective in 2017

On 30 January 2017, the Company adopted the new or amended FRS and Interpretations to FRS ("INT FRS") that are mandatory for application for the financial year. Changes to the Company's accounting policies have been made as required, in accordance with the relevant transitional provisions in the respective FRS and INT FRS.

The adoption of the above new or revised FRS did not result in any substantial changes to the Company's accounting policies nor any significant impact on these financial statements.



NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(a) Basis of preparation (continued)****FRS 7 Statement of cash flows**

The amendments to FRS 7 Statement of cash flows (Disclosure initiative) sets out required disclosures that enable users of financial statements to evaluate changes in liabilities arising from financing activities, including both changes arising from cash flows and non-cash changes.

The Company does not need to include the additional required disclosures in the Statement of Cash Flows to the Financial Statement.

(b) Revenue recognition

Revenue comprises the fair value of the consideration received or receivable for the sales of goods in the ordinary course of the Company's activities. Revenue is presented net of goods and services tax, rebates and discounts. Revenue is recognised as follows:

(1) *Sale of goods*

Revenue from sale of graphics processors and related media and communication devices is recognised when the Company has delivered the products to the customer, the customer has accepted the products and collectability of the related receivables is reasonably assured.

A sales return allowance for estimated product returns is established at the time revenue is recognised, based primarily on historical return rates.

(2) *Interest income*

Interest income is recognised using the effective interest method.

(c) Group accounting

These financial statements are the separate financial statements of Nvidia Singapore Pte Ltd. The Company is exempted from the preparation of consolidated financial statements as the Company is a wholly-owned subsidiary of Nvidia Corporation, a US-incorporated company which produces consolidated financial statements available for public use. The basis on which the subsidiary is accounted for is disclosed in Note 2(f). The main office of Nvidia Corporation is as follows: 2788 San Tomas Expressway, Santa Clara, CA 95051, U.S.A..

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(d) Employee compensation****(1) *Defined contribution plans***

Defined contribution plans are post-employment benefit plans under which the Company pays fixed contributions into separate entities such as Mandatory Provident Fund and Superannuation Fund established in Hong Kong, on a mandatory, contractual or voluntary basis. The Company has no further payment obligations once the contributions have been paid. The Company's contribution to defined contribution plans are recognised as employee compensation expense when they are due.

(2) *Employee leave entitlements*

Employee entitlements to annual leave are recognised when they accrue to employees. A provision is made for the estimated liability for annual leave as a result of services rendered by employees up to the balance sheet date.

(3) *Share-based compensation*

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards under these plans include stock options, restricted share units ("RSUs") and employee stock purchase plan ("ESPP").

The Company accounts for share based payments in accordance with FRS 102 – Share based payments. Share based compensation expense is measured at the grant date of the related equity awards, based on the fair value of the awards, and the expense is recognised over the vesting period, with a corresponding increase in the other reserve.

In case of exchange of employees' services, the equity-settled payment is measured at the fair value of equity instruments granted to employees. If exercisable at the time of grant, equity-settled payment is included in relevant cost or expenses at fair value at grant date and capital surplus is increased accordingly; if exercisable after service in waiting period is completed or specified performance conditions are met, the service obtained in current period is included in relevant cost and expenses at fair value based on the best estimation on quantity of exercisable equity instruments made by the Company in accordance with latest changes in the number of exercisable employees and subsequent information such as whether specified performance conditions are met, and capital surplus is increased accordingly.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(d) Employee compensation (continued)****(3) Share-based compensation (continued)****Stock options**

The total amount to be recognised over the vesting period is determined by reference to the fair value of the options on the date of the grant.

The fair value of stock options is determined using option pricing model. The fair value of stock appreciation right is determined using Binomial option pricing model.

At the balance sheet date, subsequent information indicates that the number of equity instruments which are different with previous estimates should be adjusted to the exercisable number of equity instruments on the vesting date. After vesting date, no further adjustment will be raised for relevant cost (expense) or total owner's equity which has been recognised.

Stock options granted to employees, subject to certain exceptions, vest over a four year period, subject to continued service, with 25% vesting on the anniversary of the hire date in the case of new hires or the anniversary of the date of grant in the case of grants to existing employees and 6.25% vesting at the end of each quarterly period thereafter. Stock options granted under the 2007 Plan generally expire ten years from the date of grant.

Restricted Stock Units ("RSU")

RSUs granted to employees vest four years, subject to continued service, with 25% vesting on a pre-determined date that is close to the anniversary of the date of grant and for grants made prior to 18 May 2016, 12.5% vesting semi-annually thereafter until fully vested and for grants made after 18 May 2016, 6.25% vesting quarterly thereafter until fully vested. The total amount to be recognised over the vesting period is determined by reference to the fair value of the ultimate holding corporation stock on the date of the grant.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(d) Employee compensation (continued)****(3) Share-based compensation (continued)****Stock options (continued)****Employee Stock Purchase Plan ("ESPP")**

Employees are also eligible to participate in an offering to have up to 10% of their earnings withheld up to certain limitations and applied on specified dates determined by the Board of Directors of Nvidia Corporation to the purchase of shares of common stock. The Board of Directors of Nvidia Corporation may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded. The employee benefit is recognised in profit or loss in the period in which the employees purchase the shares under common stock under the ESPP.

(e) Property, plant and equipment**(1) Measurement**

Property, plant and equipment are recognised at cost and subsequently carried at cost less accumulated depreciation and accumulated impairment losses.

The cost of an item of property, plant and equipment initially recognised includes its purchase price and any cost that is directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management. The projected cost of dismantlement, removal or restoration is recognised as part of the cost of property, plant and equipment if such obligation is incurred either when the item is acquired or as a consequence of using the asset during a particular period for purposes other than to produce inventories during that period.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(e) Property, plant and equipment (continued)****(2) *Depreciation***

Depreciation on property, plant and equipment is calculated using the straight-line method to allocate their depreciable amounts over their estimated useful lives as follows:

	<u>Useful lives</u>
Machinery and equipment	3 - 5 years
Computer equipment	3 - 5 years
Office equipment	5 years
Furniture	5 years
Leasehold improvement	Lesser of estimated useful life or remaining lease term

The residual values, estimated useful lives and depreciation method of property, plant and equipment are reviewed, and adjusted as appropriate, at each balance sheet date. The effects of any revision are recognised in the statement of comprehensive income for the financial period in which the changes arise.

(3) *Subsequent expenditure*

Subsequent expenditure relating to property, plant and equipment that has already been recognised is added to the carrying amount of the asset only when it is probable that future economic benefits associated with the item, will flow to the Company and the cost can be reliably measured. All other repair and maintenance expense is recognised in the statement of comprehensive income when incurred.

(4) *Disposal*

On disposal of an item of property, plant and equipment, the difference between the net disposal proceeds and its carrying amount is recognised in the statement of comprehensive income.

(f) Investment in subsidiary

Investment in subsidiary is carried at cost less accumulated impairment losses in the Company's balance sheet. On disposal of investment in subsidiary, the difference between disposal proceeds and the carrying amount of the investment is recognised in the statement of comprehensive income.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(g) Loan to related party**

Loan to related party is initially recognised at fair value plus transaction costs and subsequently carried at amortised cost using the effective interest method, less accumulated impairment losses. The Company assesses at each balance sheet date whether there is objective evidence that this financial asset is impaired and recognises an allowance for impairment when such evidence exists.

(h) Impairment of non-financial assets

Property, plant and equipment and investment in subsidiary are tested for impairment whenever there is any objective evidence or indication that these assets may be impaired.

For the purpose of impairment testing, the recoverable amount (i.e. the higher of the fair value less cost to sell and value in use) is determined on an individual asset basis unless the asset does not generate cash flows that are largely independent of those from other assets. If this is the case, the recoverable amount is determined for the cash-generating unit (CGU) to which the asset belongs.

If the recoverable amount of the asset (or CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or CGU) is reduced to its recoverable amount. The difference between the carrying amount and recoverable amount is recognised in the statement of comprehensive income.

An impairment loss for an asset is reversed if, and only if, there has been a change in the estimates used to determine the assets' recoverable amount since the last impairment loss was recognised. The carrying amount of this asset is increased to its revised recoverable amount, provided that this amount does not exceed the carrying amount that would have been determined (net of any accumulated amortisation or depreciation) had no impairment loss been recognised for the asset in prior years. A reversal of impairment loss for an asset is recognised in profit or loss.



NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(i) Loans and receivables**

Bank balances

Trade and other receivables

Bank balances, trade and other receivables are initially recognised at fair value plus transaction cost and subsequently carried at amortised cost using the effective interest method, less accumulated impairment losses.

The Company assesses at each balance sheet date whether there is objective evidence that these financial assets are impaired and recognises an allowance for impairment when such evidence exists. Significant financial difficulties of the debtor, probability that the debtor will enter bankruptcy and default or significant delay in payments are objective evidence that these financial assets are impaired.

The carrying amount of these assets is reduced through the use of an impairment allowance account which is calculated as the difference between the carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate.

These assets are presented as current assets except for those that are expected to be realised later than 12 months after the balance sheet date, which are presented as non-current assets.

(j) Trade and other payables

Trade and other payables represent liabilities for goods and services provided to the Company prior to the end of financial year which are unpaid. They are classified as current liabilities if payment is due within one year or less (or in the normal operating cycle of the business if longer). Otherwise, they are presented as non-current liabilities.

Trade and other payables are initially recognised at fair value and subsequently carried at amortised cost, using the effective interest method.

(k) Operating leases

Leases of assets where substantially all risks and rewards incidental to ownership are retained by the lessor are classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) are recognised in profit or loss on a straight-line basis over the period of the lease.

(l) Inventories

Inventories are carried at the lower of cost and net realisable value. Cost is determined using the first-in, first-out method. Net realisable value is the estimated selling price in the ordinary course of business, less applicable variable selling expenses.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(m) Income taxes**

Current income tax for current and prior periods is recognised at the amount expected to be paid to or recovered from the tax authorities, using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date.

Deferred income tax is recognised for all temporary differences except when the deferred income tax arises from the initial recognition of an asset or liability that affects neither accounting nor taxable profit or loss at the time of the transaction.

Current and deferred income tax is measured using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date, and are recognised as income or expenses in profit or loss, except to the extent that the tax arises from a transaction which is recognised directly in equity.

(n) Provisions for other liabilities and charges

Provisions for other liabilities and charges are recognised when the Company has a present legal or constructive obligation as a result of past events, it is more likely than not that an outflow of resources will be required to settle the obligation and the amount has been reliably estimated.

(o) Currency translation

The financial statements of the Company are presented in United States Dollars, which is the functional currency of the Company.

Transactions in a currency other than United States Dollar ("foreign currency") are translated into United States Dollar using the exchange rates prevailing at the dates of the transactions. Currency translation differences resulting from the settlement of such transactions and from the translation of monetary assets and liabilities denominated in foreign currencies at the closing rates at the balance sheet date are recognised in the statement of comprehensive income.

All other foreign exchange gains and losses impacting profit or loss are presented in the statement of comprehensive income within "other losses - net".

(p) Cash and cash equivalents

For the purpose of presentation in the cash flow statement, cash and cash equivalents include cash at bank and on hand which are subject to an insignificant risk of change in value.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***2. Significant accounting policies (continued)****(q) Share capital**

Ordinary shares are classified as equity.

3. Critical accounting estimates, assumptions and judgements

Estimates, assumptions and judgements are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances

Share-based payments

The Company is required to expense its employees' share-based compensation options and RSUs in accordance with FRS 102 "Share-based Payment". The Company measures share-based compensation cost based on the fair value on the grant date of each option and RSU. This cost is recognised over the period during which an employee is required to provide service in exchange for the award and option or the requisite service period, usually the vesting period, and it is adjusted for actual forfeitures that occur before vesting. In order to assess the fair value of share options, the Company is required to use certain assumptions, including the forfeitures and the service period of each employee. The use of different assumptions and estimates could produce materially different estimated fair values for the share-based compensation options and related expenses.

4. Income

	30/01/2017 to 28/01/2018 US\$'000	01/02/2016 to 29/01/2017 US\$'000
Revenue		
Sale of graphics processors and related media and communication devices	8,064,722	5,712,400
Other income – net:		
Interest income	-	68
Others	96	(9)
	<u>8,064,818</u>	<u>5,712,459</u>

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***5. Other losses – net**

	30/01/2017 to 28/01/2018 US\$'000	01/02/2016 to 29/01/2017 US\$'000
Exchange losses - net	490	459

6. Other operating expenses

	30/01/2017 to 28/01/2018 US\$'000	01/02/2016 to 29/01/2017 US\$'000
Consulting and professional expense	2,579	2,157
Utilities expense	93	94
Repair and maintenance expense	441	390
Bank charges	128	71
Bad debt expense	310	541
Insurance for credit	1,417	1,249
Engineering and testing expense	1,472	1,500
Other expenses	349	398
Total	6,789	6,400

7. Employee compensation

	30/01/2017 to 28/01/2018 US\$'000	01/02/2016 to 29/01/2017 US\$'000
Wages and salaries	6,681	6,162
Employer's contribution to defined contribution plans	667	543
Share-based compensation	1,695	901
	9,043	7,606

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***8. Income tax****(a) Income tax expense**

30/01/2017	01/02/2016
to	to
28/01/2018	29/01/2017
US\$'000	US\$'000

Income tax expense attributable to profit is made up of:

- Current income tax	790	543
----------------------	------------	------------

The tax expense on profit differs from the amount that would arise using the Singapore standard rate of income tax as explained below:

30/01/2017	01/02/2016
to	to
28/01/2018	29/01/2017
US\$'000	US\$'000

Profit before tax	2,587	3,002
Tax calculated at a tax rate of 17% (2017: 17%)	440	510
Effects of:		
- Expenses not deductible for tax purposes	402	246
- Income not subject to tax	(2)	(14)
- Different tax rates in other country	(13)	(15)
- Others	(37)	(184)
Tax charge	790	543

(b) Movements in current tax liabilities

28/01/2018	29/01/2017
US\$'000	US\$'000

Beginning of financial year	568	70
Tax expense on profit - current financial year	790	543
Income tax paid	(577)	(45)
End of the financial year	781	568

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***9. Cash and cash equivalents**

	28/01/2018 US\$'000	29/01/2017 US\$'000
Cash at bank and on hand	7,509	99,408

10. Trade and other receivables

	28/01/2018 US\$'000	29/01/2017 US\$'000
Trade receivables:		
- Immediate holding company	54	53
- Non-related parties	939,851	708,093
- Other related companies	-	28
Less: Allowance for impairment of receivables		
- Non-related parties	(2,607)	(2,297)
Trade receivables - net	937,298	705,877
Non-trade receivables:		
- Immediate holding company	111,571	173,486
- Other related companies	81,871	82,256
	193,442	255,742
Other receivables	15	1,165
	1,130,755	962,784

The non-trade receivables due from immediate holding company and other related companies are unsecured, interest-free and are repayable on demand.

11. Inventories

	28/01/2018 US\$'000	29/01/2017 US\$'000
Finished goods	335,435	340,657

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24 May 2020

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 28 January 2018

12. Property, plant and equipment

	Computer equipment US\$'000	Machinery and equipment US\$'000	Office equipment US\$'000	Furniture US\$'000	Leasehold improvement US\$'000	Total US\$'000
2018						
<u>Cost</u>						
Beginning of financial year	153	1,036	23	26	241	1,479
Additions	18	60	20	-	-	98
Disposals	-	(40)	-	(26)	-	(66)
End of financial year	171	1,056	43	-	241	1,511
<u>Accumulated depreciation</u>						
Beginning of financial year	43	135	10	23	202	413
Depreciation charge	53	217	7	3	39	319
Disposals	-	(40)	-	(26)	-	(66)
End of financial year	96	312	17	-	241	666
Net book value						
End of financial year	75	744	26	-	-	845
2017						
<u>Cost</u>						
Beginning of financial year	521	322	28	26	202	1,099
Additions	88	996	-	-	39	1,123
Disposals	(456)	(282)	(5)	-	-	(743)
End of financial year	153	1,036	23	26	241	1,479
<u>Accumulated depreciation</u>						
Beginning of financial year	360	257	11	18	137	783
Depreciation charge	139	160	4	5	65	373
Disposals	(456)	(282)	(5)	-	-	(743)
End of financial year	43	135	10	23	202	413
Net book value						
End of financial year	110	901	13	3	39	1,066

13. Investment in subsidiary

	28/01/2018 US\$'000	29/01/2017 US\$'000
Unquoted equity shares at cost	85	85

Details of investment in subsidiary are as follows:

Name of company	Principal activities	Country of incorporation	Equity holding		Cost of investment	
			28/01/2018 %	29/01/2017 %	28/01/2018 US\$'000	29/01/2017 US\$'000
NVIDIA GK	Provide marketing services to Nvidia Singapore Pte Ltd	Japan	100	100	85	85

The subsidiary does not require an audit in accordance with the laws in the country of its incorporation.



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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***14. Loan to related party**

The loan to Nvidia Brazil is unsecured, denominated in the United States Dollar and is repaid in full with interest (net of tax) of US\$62,000 on 30 Aug 2017.

15. Trade and other payables

	28/01/2018 US\$'000	29/01/2017 US\$'000
Trade payable		
- Immediate holding company	1,157,464	1,091,874
	<u>1,157,464</u>	<u>1,091,874</u>
Non-trade payables		
- Immediate holding company	4,457	4,218
- Ultimate holding company	20,197	-
- Other related companies	77,065	71,616
	<u>101,719</u>	<u>75,834</u>
Accrued operating expenses	170,541	196,613
Other payables	5,226	4,381
	<u>175,767</u>	<u>200,994</u>
	<u>1,434,950</u>	<u>1,368,702</u>

The non-trade payables to immediate holding company, ultimate holding company and other related companies are unsecured, interest-free and are repayable on demand.

16. Share capital

The Company's share capital comprise fully paid-up 2 (2017: 2) ordinary shares with no par value, amounting to a total of US\$1,000 (2017: US\$1,000).

17. Other reserves

	28/01/2018 US\$'000	29/01/2017 US\$'000
Beginning of financial year	10,425	9,524
Employee share-based payment scheme		
- Value of employee services	1,695	901
End of financial year	<u>12,120</u>	<u>10,425</u>

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***18. Share based compensation**

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards include share options, restricted share units ("RSUs"), and employee share purchase plan ("ESPP"), are granted under the following plans:

Amended and Restated 2007 Equity Incentive Plan

The Nvidia Corporation 2007 Equity Incentive Plan was approved in 2007, and subsequently amended and restated in 2012, 2013 and 2014, or the Restated 2007 Plan. This plan authorizes the issuance of share options and restricted share units.

Share options granted to employees, subject to certain exceptions, vest over a four year period subject to continued service, and generally expire ten years from the date of grant.

Subject to certain exceptions, RSUs granted to employees vest over a four year period, subject to continued service.

Amended and Restated 2012 Employee Stock Purchase Plan

The Nvidia Corporation 2012 Employee Share Purchase Plan was approved in 2012, and subsequently amended and restated in 2014, or the Restated 2012 Plan, as the successor to the 1998 Employee Share Purchase Plan.

Employees who participate in an offering may have up to 10% of their earnings withheld to the purchase of shares of common stock. The Board may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded.

The fair value of share option awards on the date of grant is determined using the Binomial model.

Fair value of RSUs is determined using the closing trading price of common stock on the date of grant, minus a dividend yield discount.

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 28 January 2018

18. Share based compensation (continued)

The following table summarises the number and weighted average fair value of ESPP granted during the period:

	2018	2017
Number of shares issued under the plan to participating Nvidia Singapore Pte Ltd's employees on 28 January 2018 (29 January 2017)	<u>27,359</u>	<u>24,694</u>

The weighted average market price during the year ended 28 January 2018 was US\$133.89 (2017: US\$46.57) and the shares had an average grant date fair value of US\$23.23 (2017: US\$21.66).

The fair value of shares issued under the ESPP has been estimated at the date of grant with the following assumptions, using the Black-Scholes model:

	2018	2017
Weighted average expected life (years)	0.5-2.0	0.5-2.0
Risk free interest rate	0.8%-1.4%	0.5%-0.9%
Volatility	40%-54%	30%-39%
Dividend yield	<u>0.3%-0.5%</u>	<u>0.7%-1.4%</u>

Nvidia Corporation uses the implied volatility as it is expected to be more reflective of market conditions and, therefore, could reasonably be expected to be a better indicator of expected volatility than historical volatility. The risk-free interest rate is based upon observed interest rates on Treasury bills appropriate for the term of employee share options.

Dividend yield is based on history and expectation of dividend pay-outs. RSU awards are not eligible for cash dividends prior to vesting; therefore, the fair value of RSUs is discounted by dividend yield. For awards granted on or subsequent to 8 November 2012, Nvidia Corporation uses a dividend yield at grant date based on the per share dividends declared during the most recent quarter.



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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***18. Share based compensation (continued)**

A reconciliation of share options and RSU movements for the financial periods ended 28 January 2018 and 29 January 2017 is shown below (average exercise price and fair value reported in US dollars):

Share-based Payment Award Activity

The following table summarises activity for share options:

	Number of share options	Weighted average exercise price
28 January 2018		
Outstanding at beginning of the year	33,869	\$14.64
Exercised*	(2,223)	\$14.24
Outstanding at end of the year	31,646	\$14.67
Options exercisable at year end	31,646	\$14.67

* The weighted average share price at the date of exercise of options exercised during the year ended 28 January 2018 was US\$171.86. No options were granted during the financial years ended 28 January 2018.

	Number of share options	Weighted average exercise price
29 January 2017		
Outstanding at beginning of the year	51,013	\$14.90
Exercised*	(17,144)	\$15.41
Outstanding at end of the year	33,869	\$14.64
Options exercisable at year end	31,036	\$14.59

* The weighted average share price at the date of exercise of options exercised during the year ended 29 January 2017 was US\$47.04. No options were granted during the financial years ended 29 January 2017.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***18. Share based compensation (continued)****Range of exercise price details of awards outstanding as at 28 January 2018:**

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	21,600	4.50
US\$15.01-US\$20.00	10,046	4.32
	<u>31,646</u>	

Range of exercise price details of awards outstanding as at 29 January 2017:

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	22,917	5.52
US\$15.01-US\$20.00	10,952	5.43
	<u>33,869</u>	

Restricted Share Units ("RSUs") Activity

The following table summarises activity for restricted share units:

	Number of RSUs	Weighted average grant date fair value
28 January 2018		
Outstanding at beginning of the year	67,165	\$30.77
Granted	14,223	\$169.15
Vested	(28,000)	\$28.67
Forfeited/Cancelled	14,885	\$79.53
Outstanding/non-vested at end of the year	<u>68,273</u>	<u>\$61.60</u>

	Number of RSUs	Weighted average grant date fair value
29 January 2017		
Outstanding at beginning of the year	78,398	\$19.96
Granted	17,790	\$57.71
Vested	(28,630)	\$18.21
Forfeited/Cancelled	(393)	\$13.98
Outstanding/non-vested at end of the year	<u>67,165</u>	<u>\$30.77</u>

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24 May 2020

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***19. Commitments**Operating lease commitments

The future minimum lease payable under non-cancellable operating leases contracted for at the balance sheet date but not recognised as liabilities are as follows:

	28/01/2018 US\$'000	29/01/2017 US\$'000
Not later than one year	544	144
Later than one year but not later than five years	765	-
	<u>1,309</u>	<u>144</u>

20. Financial risk management*Financial risk factors*

The Company's activities expose it to market risk (including currency risk, price risk and interest rate), credit risk and liquidity risk.

The management team is responsible for setting the objectives and underlying principles of financial risk management for the Company, and establishes detailed policies such as risk identification and measurement, exposure limits and hedging strategies. Financial risk management is carried out by finance personnel.

The finance personnel measure actual exposures against the limits set and prepare regular reports for the review of the management team. The information presented below is based on information received by key management.

(a) Market risk**(i) *Currency risk***

The Company's revenue, cost of operations and majority of the financial assets and liabilities are primarily in United States Dollar ("USD"). The Company is not exposed to any significant currency risk. The Company did not enter into currency forward contracts to hedge this exposure.

(ii) *Price risk*

The Company has insignificant exposure to equity price risk as it does not hold any equity financial assets.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***20. Financial risk management (continued)****(b) Credit risk**

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Company. The major classes of financial assets of the Company are cash and cash equivalents and trade receivables. Cash and cash equivalents are deposits in banks with sound credit ratings, therefore, the Company does not expect to have high credit risk in this regard.

For trade receivables, the Company adopts the policy of dealing only with customers of appropriate credit history, and obtaining sufficient collateral where appropriate to mitigate credit risk. In addition, the Company monitors its credit risk on an ongoing basis by reviewing the debtors' aging to minimise its exposure to credit risk.

Credit exposure to an individual customer is restricted by the credit limit approved by the credit controller. Customers' payment profile and credit exposure are continuously monitored by the credit controller and reported to the management and Board of Directors. The Company's trade receivables include 5 debtors (2017: 5 debtors) that represented 40.7% and 42.3% of trade receivables at balance sheet date, respectively.

(i) Financial assets that are neither past due nor impaired

Trade receivables that are neither past due nor impaired are substantially companies with a good collection track record with the Company.

(ii) Financial assets that are past due and/or impaired

There is no other class of financial assets that is past due and/or impaired except for trade receivables.

The carrying amount of trade receivables individually determined to be impaired and the movement in the related allowance for impairment are as follows:

	28/01/2018 US\$'000	29/01/2017 US\$'000
Gross amount	2,607	2,297
Less: Allowance for impairment	(2,607)	(2,297)
	-	-
Beginning of financial year	2,297	1,756
Allowance made/(utilised)	310	541
End of financial year (Note 10)	2,607	2,297

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 28 January 2018

20. Financial risk management (continued)

(c) Liquidity risk

The Company manage the liquidity risk by maintaining sufficient cash and bank balances to enable it to meet its operational requirements.

(d) Capital risk

The Company's objectives when managing capital are to ensure that the Company is adequately capitalised and to maintain an optimal capital structure.

The Company is not subject to any externally imposed capital requirements.

(e) Financial instruments by category

The carrying amounts of financial assets measured at fair value through profit or loss are disclosed on the face of the balance sheet. The aggregate carrying amounts of loans and receivables and financial liabilities at amortised cost are as follows:

	28/01/2018 US\$'000	29/01/2017 US\$'000
Loans and receivables	1,138,248	1,061,617
Financial liabilities at amortised cost	1,434,659	1,368,428

(f) Offsetting financial assets and financial liabilities(i) Financial assets

The Company has the following financial instrument subject to enforceable master netting arrangement or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial assets (a) US\$'000	Gross amounts - financial liabilities (b) US\$'000	Net amounts - financial assets presented in the balance sheet (c)=(a)-(b) US\$'000	Financial assets (d) US\$'000	Net amount (e)=(c)+(d) US\$'000
As at 28 January 2018					
Trade and other receivables	211,720	100,149	111,571	81,925	193,496
Total	211,720	100,149	111,571	81,925	193,496
As at 29 January 2017					
Trade and other receivables	209,731	36,245	173,486	82,337	255,823
Total	209,731	36,245	173,486	82,337	255,823



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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***20. Financial risk management (continued)****(f) Offsetting financial assets and financial liabilities (continued)****(ii) Financial liabilities**

The Company has the following financial instruments subject to enforceable master netting arrangements or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts – financial liabilities (a) US\$'000	Gross amounts – financial assets (b) US\$'000	Net amounts – financial liabilities presented in the balance sheet (c)=(a)-(b) US\$'000	Financial liabilities (d) US\$'000	Net amount (e)=(c)+(d) US\$'000
As at 28 January 2018					
Trade and other payables	1,564,710	407,246	1,157,464	101,719	1,259,183
Total	1,564,710	407,246	1,157,464	101,719	1,259,183
As at 29 January 2017					
Trade and other payables	1,034,886	389,421	645,465	522,243	1,167,708
Total	1,034,886	389,421	645,465	522,243	1,167,708

21. Immediate and ultimate holding corporations

The Company's immediate holding corporation is Nvidia International Inc., incorporated in the Cayman Islands. The Company's ultimate holding corporation is Nvidia Corporation, incorporated in United States of America.

22. Related party transactions

In addition to the information disclosed elsewhere in the financial statements, the following transactions took place between the Company and related parties at terms agreed between the parties:

(a) Transactions

	30/01/2017 to 28/01/2018 US\$'000	01/02/2016 to 29/01/2017 US\$'000
Purchases from immediate holding company	6,967,070	5,049,758
Payments made on behalf of a fellow subsidiary	-	381
Sales of goods to a fellow subsidiary	1,470	28
Sales of goods to immediate holding company	-	5
Marketing and administrative services fees charged by related corporations	210,571	173,322

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***22. Related party transactions (continued)**

The Company participates in the centralised cash pooling arrangement with Nvidia Corporation, its ultimate holding company. During the year, certain balances with related companies were settled and netted off through the cash pooling arrangement.

(b) Key management personnel compensation

There are no key management remuneration for the financial years ended 28 January 2018 and 29 January 2017 as the key management having authority and responsibility for planning, directing and controlling the activities of the Company are employed by related corporations.

23. New or revised accounting standards and interpretations

Below are the mandatory standards, amendments and interpretations to existing standards that have been published, and are relevant for the Group's accounting periods beginning on or after 29 January 2018 and which the Group has not early adopted:

(a) FRS 115 Revenue from contracts with customers (effective for annual periods beginning on or after 1 January 2018)

This is the converged standard on revenue recognition. It replaces FRS 11 Construction contracts, FRS 18 Revenue, and related interpretations. Revenue is recognised when a customer obtains control of a good or service. A customer obtains control when it has the ability to direct the use of and obtain the benefits from the good or service. The core principle of FRS 115 is that an entity recognises revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. An entity recognises revenue in accordance with that core principle by applying the following steps:

- Step 1: Identify the contract(s) with a customer
- Step 2: Identify the performance obligations in the contract
- Step 3: Determine the transaction price
- Step 4: Allocate the transaction price to the performance obligations in the contract
- Step 5: Recognise revenue when (or as) the entity satisfies a performance obligation

FRS 115 also includes a cohesive set of disclosure requirements that will result in an entity providing users of financial statements with comprehensive information about the nature, amount, timing and uncertainty of revenue and cash flows arising from the entity's contracts with customers.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***23. New or revised accounting standards and interpretations (continued)**

- (a) FRS 115 Revenue from contracts with customers (effective for annual periods beginning on or after 1 January 2018) (continued)

Management is currently assessing the effects of applying the new standard on the Company's financial statements and has identified the following areas that are likely to be affected:

- (i) Rights of return – FRS 115 requires separate presentation on the balance sheet of the right to recover the goods from the customer and the refund obligation; and
- (ii) Accounting for certain costs incurred in fulfilling a contract – certain costs which are currently expensed may need to be recognised as an asset under FRS 115.

The Company is expected to adopt this guidance beginning in the first quarter of fiscal year 2019 using the modified retrospective approach. The Company has made progress in, and continue to assess changes in policies, processes, systems and controls necessary to meet the additional requirements of the guidance. While still finalizing the analysis to qualify the adoption impact of the provisions of the new revenue standard, the Company does not expect it to have a material impact on the financial statements. The Company does expect to provide additional disclosure under this guidance, including more information regarding estimates and judgments, practical expedients used, contract balances and performance obligations.

- (b) FRS 116 Leases (effective for annual periods beginning on or after 1 January 2019)

FRS 116 will result in almost all leases being recognised on the balance sheet, as the distinction between operating and finance leases is removed.

Under the new standard, an asset (the right to use the leased item) and a financial liability to pay rentals are recognised. The only exceptions are short-term and low-value leases. The accounting for lessors will not change significantly.

Some of the Company's commitments may be covered by the exception for short-term and low-value leases and some commitments may relate to arrangements that will not qualify as leases under FRS 116.

The new standard also introduces expanded disclosure requirements and changes in presentation.

The Company has yet to determine to what extent the commitments as at 28 January 2018 will result in the recognition of an asset and a liability for future payments and how this will affect the Company's profit and classification of cash flows.

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 28 January 2018***23. New or revised accounting standards and interpretations (continued)**

- (c) FRS 109 Financial instruments (effective for annual periods beginning on or after 1 January 2018)

FRS 109 replaces FRS 39 *Financial instruments: Recognition and Measurement* and its relevant interpretations.

FRS 109 retains the mixed measurement model and establishes three primary measurement categories for financial assets: amortised cost, fair value through Other Comprehensive Income (OCI) and fair value through Profit or Loss. The basis of classification depends on the entity's business model and the contractual cash flow characteristics of the financial asset. Investments in equity instruments are required to be measured at fair value through profit or loss with an irrevocable option at inception to present changes in fair value in OCI (FVOCI). Gains and losses realised on the sale of such financial assets at FVOCI are not transferred to profit or loss on sale but reclassified from the FVOCI reserve to retained earnings.

Under FRS 109, there are no changes to the classification and measurement requirements for financial liabilities except for the recognition of fair value changes arising from changes in own credit risk. For liabilities designated at fair value through profit or loss, such changes are recognised in OCI.

FRS 109 relaxes the requirements for hedge effectiveness by replacing the bright line hedge effectiveness tests. It requires an economic relationship between the hedged item and hedging instrument and for the 'hedged ratio' to be the same as the one management uses for risk management purposes.

There is also now a new expected credit losses impairment model that replaces the incurred loss impairment model used in FRS 39. It applies to financial assets classified at amortised cost, debt instruments measured at fair value through OCI, contract assets under FRS 115 *Revenue from contracts with customers*, lease receivables, loan commitments and certain financial guarantee contracts.

The new standard also introduces expanded disclosure requirements and changes in presentation.

While still finalizing the analysis to qualify the adoption impact of the provisions of the new standard, the Company does not expect any significant impact to the allowance for impairment of receivables and the opening retained earnings to arise from the application of the expected credit losses impairment mode.

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 28 January 2018

24. Authorisation of financial statements

These financial statements were authorised for issue in accordance with a resolution of the Board of Directors of Nvidia Singapore Pte Ltd on **12 JUN 2018**



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Exhibit P

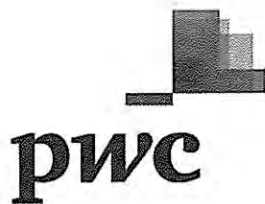
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NVIDIA SINGAPORE PTE LTD

(Incorporated in Singapore. Registration Number 200003831M)

FINANCIAL STATEMENT

For the financial year ended 27 January 2019



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NVIDIA SINGAPORE PTE LTD
(Incorporated in Singapore)

FINANCIAL STATEMENT
For the financial year ended 27 January 2019

Contents

	Page
Directors' Statement	1
Independent Auditor's Report	3
Statement of Comprehensive Income	5
Balance Sheet	6
Statement of Changes in Equity	7
Statement of Cash Flows	8
Notes to the Financial Statements	9

NVIDIA SINGAPORE PTE LTD**DIRECTORS' STATEMENT***For the financial year ended 27 January 2019*

The directors present their report to the shareholder together with the audited financial statements for the financial year ended 27 January 2019.

In the opinion of the directors,

- (a) the financial statements as set out on pages 5 to 38 are drawn up so as to give a true and fair view of the financial position of the Company at 27 January 2019 and the financial performance, changes in equity and cash flows of the Company for the financial year covered by the financial statements; and
- (b) at the date of this statement, there are reasonable grounds to believe that the Company will be able to pay its debts as and when they fall due.

Directors

The directors in office at the date of this statement are as follows:

Lee Kay Beng
Karen Theresa Burns
Michael John Byron
Rebecca Peters

Arrangements to enable directors to acquire shares and debentures

Neither at the end of nor at any time during the financial year was the Company a party to any arrangement whose object was to enable the directors of the Company to acquire benefits by means of the acquisition of shares in, or debentures of, the Company or any other body corporate.

Directors' interests in shares and debentures

According to the register of directors' shareholdings, none of the directors holding office at the end of the financial year had any interest in the shares or debentures of the Company or its related corporations, except as follows:

	Holdings registered in name of Director	
	At 27.01.2019	At 28.01.2018
Ultimate Holding Corporation (No. of ordinary shares)		
-Nvidia Corporation		
Michael John Byron	33,951	28,945
Karen Theresa Burns	3,996	15,124
Rebecca Peters	642	1,974

NVIDIA SINGAPORE PTE LTD**DIRECTORS' STATEMENT***For the financial year ended 27 January 2019***Directors' interests in shares and debentures (continued)**

	At 27.01.2019	At 28.01.2018
<u>(Unissued ordinary shares under share options)</u>		
-Nvidia Corporation		
Michael John Byron	-	9,018
Karen Theresa Burns	31,275	31,275
Rebecca Peters	1,875	1,875
<u>(Unvested restricted shares units)</u>		
-Nvidia Corporation		
Michael John Byron	46,138	84,858
Karen Theresa Burns	50,827	93,151
Rebecca Peters	15,579	27,091

Share options

No options were granted during the financial year to subscribe for unissued shares of the Company.

No shares were issued during the financial year by virtue of the exercise of options to take up unissued shares of the Company.

There were no unissued shares of the Company under option at the end of the financial year.

Independent auditor

The independent auditor, PricewaterhouseCoopers LLP, has expressed its willingness to accept re-appointment.

On behalf of the directors



MICHAEL JOHN BYRON
Director

27 JUN 2019



KAREN THERESA BURNS
Director

INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF NVIDIA SINGAPORE PTE LTD

Report on the Financial Statements

Our opinion

In our opinion, the accompanying financial statements of Nvidia Singapore Pte Ltd (the "Company") are properly drawn up in accordance with the provisions of the Companies Act, Chapter 50 (the "Act") and Financial Reporting Standards in Singapore ("FRSs") so as to give a true and fair view of the balance sheet of the Company as at 27 January 2019 and of the financial performance, changes in equity and cash flows of the Company for the year ended on that date.

What we have audited

The financial statements of the Company comprise:

- the balance sheet as at 27 January 2019;
- the statement of comprehensive income for the year then ended;
- the statement of changes in equity for the year then ended;
- the statement of cash flows for the year then ended; and
- the notes to the financial statements, including a summary of significant accounting policies.

Basis for Opinion

We conducted our audit in accordance with Singapore Standards on Auditing ("SSAs"). Our responsibilities under those standards are further described in the *Auditor's Responsibilities for the Audit of the Financial Statements* section of our report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We are independent of the Company in accordance with the Accounting and Corporate Regulatory Authority Code of Professional Conduct and Ethics for Public Accountants and Accounting Entities ("ACRA Code") together with the ethical requirements that are relevant to our audit of the financial statements in Singapore, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the ACRA Code.

Other Information

Management is responsible for the other information. The other information comprises the Directors' Statement but does not include the financial statements and our auditor's report thereon.

Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of Management and Directors for the Financial Statements

Management is responsible for the preparation of financial statements that give a true and fair view in accordance with the provisions of the Act and FRSs, and for devising and maintaining a system of internal accounting controls sufficient to provide a reasonable assurance that assets are safeguarded against loss from unauthorised use or disposition; and transactions are properly authorised and that they are recorded as necessary to permit the preparation of true and fair financial statements and to maintain accountability of assets.

In preparing the financial statements, management is responsible for assessing the Company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the Company or to cease operations, or has no realistic alternative but to do so.

The directors' responsibilities include overseeing the Company's financial reporting process.

INDEPENDENT AUDITOR'S REPORT TO THE SHAREHOLDER OF NVIDIA SINGAPORE PTE LTD (continued)

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SSAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with SSAs, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Conclude on the appropriateness of management's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on Other Legal and Regulatory Requirements

In our opinion, the accounting and other records required by the Act to be kept by the Company have been properly kept in accordance with the provisions of the Act.



PricewaterhouseCoopers LLP
Public Accountants and Chartered Accountants
Singapore,

27 JUN 2019

NVIDIA SINGAPORE PTE LTD**STATEMENT OF COMPREHENSIVE INCOME***For the financial year ended 27 January 2019*

	Note	29/01/2018 to 27/01/2019 US\$'000	30/01/2017 to 28/01/2018 US\$'000
Revenue	4	9,727,059	8,064,722
Other income - net		1	96
Other gains/(losses) - net	5	363	(490)
Expenses			
- Raw materials and other consumables consumed		(9,457,611)	(7,830,208)
- Employee compensation	7	(13,561)	(9,043)
- Travelling expenses		(385)	(237)
- Sales and marketing expenses		(2,281)	(4,063)
- Depreciation of property, plant and equipment		(335)	(319)
- Intercompany service expenses		(246,944)	(210,571)
- Rental on operating leases		(547)	(511)
- Other operating expenses	6	(4,697)	(6,789)
Total expenses		(9,726,361)	(8,061,741)
Profit before income tax		1,062	2,587
Income tax expense	8	(644)	(790)
Net profit after tax/ Total comprehensive income		418	1,797

The accompanying notes form an integral part of these financial statements.

NVIDIA SINGAPORE PTE LTD**BALANCE SHEET***As at 27 January 2019*

	Note	27/01/2019 US\$'000	28/01/2018 US\$'000
ASSETS			
Current assets			
Cash and cash equivalents	9	4,699	7,509
Trade and other receivables	10	1,348,605	1,130,755
Inventories	11	631,270	335,435
Prepayment and deposits		863	4,619
		<u>1,985,437</u>	<u>1,478,318</u>
Non-current assets			
Property, plant and equipment	12	780	845
Investment in subsidiary	13	85	85
		<u>865</u>	<u>930</u>
Total assets		<u>1,986,302</u>	<u>1,479,248</u>
LIABILITIES			
Current liabilities			
Trade and other payables	14	1,937,843	1,434,950
Current income tax liabilities	8	474	781
		<u>1,938,317</u>	<u>1,435,731</u>
Total liabilities		<u>1,938,317</u>	<u>1,435,731</u>
NET ASSETS		<u>47,985</u>	<u>43,517</u>
SHAREHOLDER'S EQUITY			
Share capital	15	1	1
Other reserves	16	16,170	12,120
Retained earnings		31,814	31,396
		<u>47,985</u>	<u>43,517</u>

The accompanying notes form an integral part of these financial statements.

NVIDIA SINGAPORE PTE LTD**STATEMENT OF CHANGES IN EQUITY***For the financial year ended 27 January 2019*

	Share capital US\$'000	Other reserves US\$'000	Retained earnings US\$'000	Total equity US\$'000
2019				
Beginning of financial year	1	12,120	31,396	43,517
Share-based compensation	-	4,050	-	4,050
Total comprehensive income	-	-	418	418
End of financial year	1	16,170	31,814	47,985
2018				
Beginning of financial year	1	10,425	29,599	40,025
Share-based compensation	-	1,695	-	1,695
Total comprehensive income	-	-	1,797	1,797
End of financial year	1	12,120	31,396	43,517

The accompanying notes form an integral part of these financial statements.

NVIDIA SINGAPORE PTE LTD**STATEMENT OF CASH FLOWS***For the financial year ended 27 January 2019*

	Note	29/01/2018 to 27/01/2019 US\$'000	30/01/2017 to 28/01/2018 US\$'000
Cash flows from operating activities			
Net profit after tax		418	1,797
Adjustments for:			
- Income tax expense	8	644	790
- Depreciation of property, plant and equipment	12	335	319
- Share-based compensation	7	4,050	1,695
Operating cash flow before working capital changes		5,447	4,601
Change in operating assets and liabilities			
- Trade and other receivables		(217,850)	(167,971)
- Inventories		(295,835)	5,222
- Trade and other payables		502,893	66,248
- Prepayments and deposits		3,756	176
Cash used in operations		(1,589)	(91,724)
Income tax paid	8	(951)	(577)
Net cash used in operating activities		(2,540)	(92,301)
Cash flows from investing activities			
Additions of property, plant and equipment	12	(270)	(98)
Repayment of loan to related party		-	500
Net cash (used in)/generated from investing activities		(270)	402
Net decrease in cash and cash equivalents		(2,810)	(91,899)
Cash and cash equivalents at beginning of financial period		7,509	99,408
Cash and cash equivalents at end of financial period	9	4,699	7,509

The accompanying notes form an integral part of these financial statements.

NVIDIA SINGAPORE PTE LTD**NOTES TO THE FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

These notes form an integral part of and should be read in conjunction with the accompanying financial statements.

1. General information

The Company is incorporated in Singapore. The address of its registered office is 112 Robinson Road, #05-01, Singapore 068902.

The principal activity of the Company consists of sales of graphics processors and media and communication devices.

The principal activities of its subsidiary are to provide marketing services to Nvidia Singapore Pte Ltd.

2. Significant accounting policies**2.1 Basis of preparation**

The financial statements have been prepared in accordance with Singapore Financial Reporting Standards ("FRS") under the historical cost convention, except as disclosed in the accounting policies below.

The preparation of these financial statements in conformity with FRS requires management to exercise its judgement in the process of applying the Company's accounting policies. It also requires the use of certain critical accounting estimates and assumptions. The areas involving a higher degree of judgement or complexity, or areas where assumptions and estimates are significant to the financial statements are disclosed in Note 3.

Interpretations and amendments to published standards effective in 2018

On 29 January 2018, the Company adopted the new or amended FRS and Interpretations of FRS ("INT FRS") that are mandatory for application for the financial year. Changes to the Company's accounting policies have been made as required, in accordance with the transitional provisions in the respective FRS and INT FRS.

The adoption of these new or amended FRS and INT FRS did not result in substantial changes to the Company's accounting policies and had no material effect on the amounts reported for the current or prior financial years except for the following:

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.1 Basis of preparation (continued)***(a) Adoption of FRS 115 Revenue from Contracts with Customers*

The Company has adopted the new standard using the modified retrospective approach with the cumulative impact of the adoption recognised in the opening retained earnings at 29 January 2018. Comparative information for financial year ended 2018 is not restated.

The accounting policies for revenue from contracts with customers under FRS 115 are disclosed in Note 2.2.

The adoption of FRS 115 did not have a material impact on the Company's financial statement as at 28 January 2018 and 27 January 2019.

(b) Adoption of FRS 109 Financial Instruments

The Company has adopted the new standard retrospectively from 29 January 2018, in line with the transition provision permitted under the standards. Comparatives for financial year ended 2018 are not restated and the Company has recognised any difference between the carrying amounts at 28 January 2018 and 29 January 2018 in the opening retained earnings.

The accounting policies for financial instruments under FRS 109 are disclosed in Note 2.8. There are no effects on the adoption of FRS 109 for the current year and opening retained earnings.

(i) Impairment of financial assets

The Company has the following financial assets subject to the expected credit loss impairment model under FRS 109:

- Cash and bank deposits;
- Trade and other receivables; and
- Loan to related corporation.

The impairment methodology for each of these classes of financial assets under FRS 109 are different as disclosed in Note 2.8 and Note 19(b).

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.2 Revenue recognition**

Revenue is derived from product sales, including hardware and systems. Revenue recognition is determined through the following steps: (1) identification of the contract with a customer; (2) identification of the performance obligations in the contract; (3) determination of the transaction price; (4) allocation of the transaction price to the performance obligations in the contract; and (5) recognition of revenue when, or as, a performance obligation is satisfied.

Product Sales Revenue

Revenue from product sales (sale of graphics processors and related media and communication devices) is recognized when the Company has delivered the products to the customer, the customer has accepted the products and collectability of the related receivables is reasonably assured. Revenue is recognized net of allowances for returns, customer programs and any taxes collected from customers.

For products sold with a right of return, a reduction to revenue is recorded by establishing a sales return allowance for estimated product returns at the time revenue is recognized, based primarily on historical return rates. However, if product returns for a financial year are anticipated to exceed historical return rates, additional sales return allowances may be determined to be required, to properly reflect the estimated exposure for product returns.

The Company's customer programs involve sales rebates, which are designed to serve as sales incentives to resellers of the products in various target markets, and marketing development funds ("MDFs"), which represent monies paid to the Company's customers that are earmarked for market segment development and are designed to support its activities while also promoting NVIDIA products. These customer programs are accounted as a reduction to revenue and accrued for potential rebates and MDFs based on the amount expected to be claimed by customers.

2.3 Group accounting

These financial statements are the separate financial statements of Nvidia Singapore Pte Ltd. The Company is exempted from the preparation of consolidated financial statements as the Company is a wholly-owned subsidiary of Nvidia Corporation, a US-incorporated company which produces consolidated financial statements available for public use. The basis on which the subsidiary is accounted for is disclosed in Note 2(f). The main office of Nvidia Corporation is as follows: 2788 San Tomas Expressway, Santa Clara, CA 95051, U.S.A..

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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.4 Employee compensation***(a) Defined contribution plans*

Defined contribution plans are post-employment benefit plans under which the Company pays fixed contributions into separate entities such as Mandatory Provident Fund and Superannuation Fund established in Hong Kong, on a mandatory, contractual or voluntary basis. The Company has no further payment obligations once the contributions have been paid. The Company's contribution to defined contribution plans are recognised as employee compensation expense when they are due.

(b) Employee leave entitlements

Employee entitlements to annual leave are recognised when they accrue to employees. A provision is made for the estimated liability for annual leave as a result of services rendered by employees up to the balance sheet date.

(c) Share-based compensation

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards under these plans include stock options, restricted share units ("RSUs") and employee stock purchase plan ("ESPP").

The Company accounts for share based payments in accordance with FRS 102 – Share based payments. Share based compensation expense is measured at the grant date of the related equity awards, based on the fair value of the awards, and the expense is recognised over the vesting period, with a corresponding increase in the other reserve.

In case of exchange of employees' services, the equity-settled payment is measured at the fair value of equity instruments granted to employees. If exercisable at the time of grant, equity-settled payment is included in relevant cost or expenses at fair value at grant date and capital surplus is increased accordingly; if exercisable after service in waiting period is completed or specified performance conditions are met, the service obtained in current period is included in relevant cost and expenses at fair value based on the best estimation on quantity of exercisable equity instruments made by the Company in accordance with latest changes in the number of exercisable employees and subsequent information such as whether specified performance conditions are met, and capital surplus is increased accordingly.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.4 Employee compensation (continued)***(c) Share-based compensation (continued)*Stock options

The total amount to be recognised over the vesting period is determined by reference to the fair value of the options on the date of the grant.

The fair value of stock options is determined using option pricing model. The fair value of stock appreciation right is determined using Binomial option pricing model.

At the balance sheet date, subsequent information indicates that the number of equity instruments which are different with previous estimates should be adjusted to the exercisable number of equity instruments on the vesting date. After vesting date, no further adjustment will be raised for relevant cost (expense) or total owner's equity which has been recognised.

Stock options granted to employees, subject to certain exceptions, vest over a four year period, subject to continued service, with 25% vesting on the anniversary of the hire date in the case of new hires or the anniversary of the date of grant in the case of grants to existing employees and 6.25% vesting at the end of each quarterly period thereafter. Stock options granted under the 2007 Plan generally expire ten years from the date of grant.

Restricted Stock Units ("RSU")

RSUs granted to employees vest four years, subject to continued service, with 25% vesting on a pre-determined date that is close to the anniversary of the date of grant and for grants made prior to 18 May 2016, 12.5% vesting semi-annually thereafter until fully vested and for grants made after 18 May 2016, 6.25% vesting quarterly thereafter until fully vested. The total amount to be recognised over the vesting period is determined by reference to the fair value of the ultimate holding corporation stock on the date of the grant.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***2. Significant accounting policies (continued)****2.4 Employee compensation (continued)****(c) Share-based compensation (continued)**Employee Stock Purchase Plan ("ESPP")

Employees are also eligible to participate in an offering to have up to 10% of their earnings withheld up to certain limitations and applied on specified dates determined by the Board of Directors of Nvidia Corporation to the purchase of shares of common stock. The Board of Directors of Nvidia Corporation may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded. The employee benefit is recognised in profit or loss in the period in which the employees purchase the shares under common stock under the ESPP.

2.5 Property, plant and equipment

Property, plant and equipment are recognised at cost less accumulated depreciation and accumulated impairment losses.

Subsequent expenditure relating to property, plant and equipment that has already been recognised is added to the carrying amount of the asset only when it is probable that future economic benefits associated with the item will flow to the Company and the cost of the item can be measured reliably. All other repair and maintenance expenses are recognised in the statement of comprehensive income when incurred.

Depreciation is calculated using the straight-line method to allocate depreciable amounts over their estimated useful lives. The estimated useful lives are as follows:

	<u>Useful lives</u>
Machinery and equipment	3 - 5 years
Computer equipment	3 - 5 years
Office equipment	5 years
Furniture	5 years
Leasehold improvement	Lesser of estimated useful life or remaining lease term

The residual values, estimated useful lives and depreciation method of property, plant and equipment are reviewed, and adjusted as appropriate, at each balance sheet date. The effects of any revision are recognised in the statement of comprehensive income for the financial period in which the changes arise.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.6 Investment in subsidiary**

Investment in subsidiary is carried at cost less accumulated impairment losses in the Company's balance sheet. On disposal of investment in subsidiary, the difference between disposal proceeds and the carrying amount of the investment is recognised in the statement of comprehensive income.

2.7 Impairment of non-financial assets

Property, plant and equipment and investment in subsidiary are tested for impairment whenever there is any objective evidence or indication that these assets may be impaired.

For the purpose of impairment testing, the recoverable amount (i.e. the higher of the fair value less cost to sell and value in use) is determined on an individual asset basis unless the asset does not generate cash flows that are largely independent of those from other assets. If this is the case, the recoverable amount is determined for the cash-generating unit (CGU) to which the asset belongs.

If the recoverable amount of the asset (or CGU) is estimated to be less than its carrying amount, the carrying amount of the asset (or CGU) is reduced to its recoverable amount. The difference between the carrying amount and recoverable amount is recognised in the statement of comprehensive income.

An impairment loss for an asset is reversed if, and only if, there has been a change in the estimates used to determine the assets' recoverable amount since the last impairment loss was recognised. The carrying amount of this asset is increased to its revised recoverable amount, provided that this amount does not exceed the carrying amount that would have been determined (net of any accumulated amortisation or depreciation) had no impairment loss been recognised for the asset in prior years. A reversal of impairment loss for an asset is recognised in profit or loss.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***2. Significant accounting policies (continued)****2.8 Financial assets**

- (a) *The accounting for financial assets before 29 January 2018 under FRS 39 are as follows:*

- (i) Loan and receivables
Bank balances
Trade and other receivables

Bank balances and trade and other receivables are initially recognised at fair value plus transaction cost and subsequently carried at amortised cost using the effective interest method, less accumulated impairment losses.

The Company assesses at each balance sheet date whether there is objective evidence that these financial assets are impaired and recognises an allowance for impairment when such evidence exists. Significant financial difficulties of the debtor, probability that the debtor will enter bankruptcy and default or significant delay in payments are objective evidence that these financial assets are impaired.

The carrying amount of these assets is reduced through the use of an impairment allowance account which is calculated as the difference between the carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate.

These assets are presented as current assets except for those that are expected to be realised later than 12 months after the balance sheet date, which are presented as non-current assets.

- (b) *The accounting for financial assets from 29 January 2018 under FRS 109 are as follows:*

The Company classifies its financial assets into the following measurement categories:

- Amortised cost;
- Fair value through other comprehensive income (FVOCI); and
- Fair value through profit or loss (FVPL)

The classification of debt instruments depends on the Company's business model for managing the financial assets as well as the contractual terms of the cash flows of the financial assets.

Financial assets with embedded derivatives are considered in their entirety when determining whether their cash flows are solely payment of principal and interest.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.8 Financial assets (continued)**

- (b) *The accounting for financial assets from 29 January 2018 under FRS 109 are as follows: (continued)*

The Company reclassifies debt instruments when and only when its business model for managing those assets changes.

(i) At initial recognition

At initial recognition, the Company measures a financial asset at its fair value plus, in the case of a financial asset not at fair value through profit or loss, transaction costs that are directly attributable to the acquisition of the financial assets. Transaction costs of financial assets carried at fair value through profit or loss are expensed in profit or loss.

(ii) At subsequent measurement

1. Debt instrument

Debt instruments of the Company mainly comprise of bank balances and trade and other receivables. There are two prescribed subsequent measurement categories, depending on the Company's business model in managing the assets and the cash flow characteristic of the assets. The Company managed these group of financial assets by collecting the contractual cash flow and these cash flows represents solely payment of principal and interest. Accordingly, these group of financial assets are measured at amortised cost subsequent to initial recognition.

A gain or loss on a debt investment that is subsequently measured at amortised cost and is not part of a hedging relationship is recognised in profit or loss when the asset is derecognised or impaired. Interest income from these financial assets are recognised using the effective interest rate method.

The Company assesses on forward looking basis the expected credit losses associated with its debt instruments carried at amortised cost.

For trade receivables, the Company applied the simplified approach permitted by the FRS 109, which requires expected lifetime losses to be recognised from initial recognition of the receivables.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.8 Financial assets (continued)**

(b) *The accounting for financial assets from 29 January 2018 under FRS 109 are as follows: (continued)*

(ii) At subsequent measurement (continued)

For bank balances and other receivables, the general 3 stage approach is applied. Credit loss allowance is based on 12-month expected credit loss if there is no significant increase in credit risk since initial recognition of the assets. If there is a significant increase in credit risk since initial recognition, lifetime expected credit loss will be calculated and recognised.

2.9 Trade and other payables

Trade and other payables represent liabilities for goods and services provided to the Company prior to the end of financial year which are unpaid. They are classified as current liabilities if payment is due within one year or less (or in the normal operating cycle of the business if longer). Otherwise, they are presented as non-current liabilities.

Trade and other payables are initially recognised at fair value and subsequently carried at amortised cost, using the effective interest method.

2.10 Operating leases

Leases of assets where substantially all risks and rewards incidental to ownership are retained by the lessor are classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) are recognised in profit or loss on a straight-line basis over the period of the lease.

2.11 Inventories

Inventories are carried at the lower of cost and net realisable value. Cost is determined using the first-in, first-out method. Net realisable value is the estimated selling price in the ordinary course of business, less applicable variable selling expenses.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

2. Significant accounting policies (continued)**2.12 Income taxes**

Current income tax for current and prior periods is recognised at the amount expected to be paid to or recovered from the tax authorities, using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date.

Deferred income tax is recognised for all temporary differences except when the deferred income tax arises from the initial recognition of an asset or liability that affects neither accounting nor taxable profit or loss at the time of the transaction.

Current and deferred income tax is measured using the tax rates and tax laws that have been enacted or substantively enacted by the balance sheet date, and are recognised as income or expenses in profit or loss, except to the extent that the tax arises from a transaction which is recognised directly in equity.

2.13 Provisions for other liabilities and charges

Provisions for other liabilities and charges are recognised when the Company has a present legal or constructive obligation as a result of past events, it is more likely than not that an outflow of resources will be required to settle the obligation and the amount has been reliably estimated.

2.14 Currency translation

The financial statements of the Company are presented in United States Dollars, which is the functional currency of the Company.

Transactions in a currency other than United States Dollar ("foreign currency") are translated into United States Dollar using the exchange rates prevailing at the dates of the transactions. Currency translation differences resulting from the settlement of such transactions and from the translation of monetary assets and liabilities denominated in foreign currencies at the closing rates at the balance sheet date are recognised in the statement of comprehensive income.

All other foreign exchange gains and losses impacting profit or loss are presented in the statement of comprehensive income within "other losses - net".

2.15 Cash and cash equivalents

For the purpose of presentation in the cash flow statement, cash and cash equivalents include cash at bank and on hand which are subject to an insignificant risk of change in value.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***2. Significant accounting policies (continued)****2.16 Share capital**

Ordinary shares are classified as equity.

3. Critical accounting estimates, assumptions and judgements

Estimates, assumptions and judgements are continually evaluated and are based on historical experience and other factors, including expectations of future events that are believed to be reasonable under the circumstances

Share-based payments

The Company is required to expense its employees' share-based compensation options and RSUs in accordance with FRS 102 "Share-based Payment". The Company measures share-based compensation cost based on the fair value on the grant date of each option and RSU. This cost is recognised over the period during which an employee is required to provide service in exchange for the award and option or the requisite service period, usually the vesting period, and it is adjusted for actual forfeitures that occur before vesting. In order to assess the fair value of share options, the Company is required to use certain assumptions, including the forfeitures and the service period of each employee. The use of different assumptions and estimates could produce materially different estimated fair values for the share-based compensation options and related expenses.

4. Revenue

	29/01/2018 To 27/01/2019 US\$'000	30/01/2017 to 28/01/2018 US\$'000
Sale of graphics processors and related media and communication devices	<u>9,727,059</u>	<u>8,064,722</u>

Revenue from sale of graphics processors and related media and communication devices is recognised at a point in time.

* The Company has initially applied FRS 115 using the modified retrospective method. Under this method, the comparative information is not restated.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***5. Other losses – net**

	29/01/2018 To 27/01/2019 US\$'000	30/01/2017 to 28/01/2018 US\$'000
Exchange gains/(losses) - net	<u>363</u>	<u>(490)</u>

6. Other operating expenses

	29/01/2018 to 27/01/2019 US\$'000	30/01/2017 to 28/01/2018 US\$'000
Consulting and professional expense	3,145	2,579
Utilities expense	98	93
Repair and maintenance expense	407	441
Bank charges	148	128
(Reversal of allowance)/allowance for impairment of receivables	(663)	310
Insurance for credit	(75)	1,417
Engineering and testing expense	1,494	1,472
Other expenses	143	349
Total	<u>4,697</u>	<u>6,789</u>

7. Employee compensation

	29/01/2018 to 27/01/2019 US\$'000	30/01/2017 to 28/01/2018 US\$'000
Wages and salaries	8,730	6,681
Employer's contribution to defined contribution plans	781	667
Share-based compensation	4,050	1,695
	<u>13,561</u>	<u>9,043</u>

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***8. Income tax****(a) Income tax expense**

29/01/2018	30/01/2017
to	to
27/01/2019	28/01/2018
US\$'000	US\$'000

Income tax expense attributable to profit is made up of:

- Current income tax	644	790
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The tax expense on profit differs from the amount that would arise using the Singapore standard rate of income tax as explained below:

29/01/2018	30/01/2017
to	to
27/01/2019	28/01/2018
US\$'000	US\$'000

Profit before tax	1,062	2,587
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Tax calculated at a tax rate of 17% (2018: 17%)	181	440
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Effects of:

- Expenses not deductible for tax purposes	530	402
- Income not subject to tax	-	(2)
- Different tax rates in other country	(26)	(13)
- Others	(41)	(37)

Tax charge	644	790
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(b) Movements in current tax liabilities

27/01/2019	28/01/2018
US\$'000	US\$'000

Beginning of financial year	781	568
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Tax expense on profit - current financial year	644	790
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Income tax paid	(951)	(577)
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End of the financial year	474	781
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NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***9. Cash and cash equivalents**

	27/01/2019 US\$'000	28/01/2018 US\$'000
Cash at bank and on hand	4,699	7,509

10. Trade and other receivables

	27/01/2019 US\$'000	28/01/2018 US\$'000
Trade receivables:		
- Immediate holding corporation	54	54
- Non-related parties	1,183,836	939,851
Less: Allowance for impairment of receivables		
- Non-related parties	(1,944)	(2,607)
Trade receivables - net	1,181,946	937,298
Non-trade receivables:		
- Immediate holding corporation	69,761	111,571
- Related corporations	96,898	81,871
	166,659	193,442
Other receivables	-	15
	1,348,605	1,130,755

The non-trade receivables due from immediate holding corporations and related corporations are unsecured, interest-free and are repayable on demand.

11. Inventories

	27/01/2019 US\$'000	28/01/2018 US\$'000
Finished goods	631,270	335,435

NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 27 January 2019

12. Property, plant and equipment

	Computer equipment US\$'000	Machinery and equipment US\$'000	Office equipment US\$'000	Furniture US\$'000	Leasehold improvement US\$'000	Total US\$'000
2019						
<u>Cost</u>						
Beginning of financial year	171	1,056	43	-	241	1,511
Additions	10	10	44	5	201	270
Disposals	(40)	-	-	-	-	(40)
End of financial year	141	1,066	87	5	442	1,741
<u>Accumulated depreciation</u>						
Beginning of financial year	96	312	17	-	241	666
Depreciation charge	48	232	11	-	44	335
Disposals	(40)	-	-	-	-	(40)
End of financial year	104	544	28	-	285	961
Net book value						
End of financial year	37	522	59	5	157	780
2018						
<u>Cost</u>						
Beginning of financial year	153	1,036	23	26	241	1,479
Additions	18	60	20	-	-	98
Disposals	-	(40)	-	(26)	-	(66)
End of financial year	171	1,056	43	-	241	1,511
<u>Accumulated depreciation</u>						
Beginning of financial year	43	135	10	23	202	413
Depreciation charge	53	217	7	3	39	319
Disposals	-	(40)	-	(26)	-	(66)
End of financial year	96	312	17	-	241	666
Net book value						
End of financial year	75	744	26	-	-	845

13. Investment in subsidiary

	27/01/2019 US\$'000	28/01/2018 US\$'000
Unquoted equity shares at cost	85	85

Details of investment in subsidiary are as follows:

Name of company	Principal activities	Country of incorporation	Equity holding		Cost of investment	
			27/01/2019 %	28/01/2018 %	27/01/2019 US\$'000	28/01/2018 US\$'000
NVIDIA GK	Provide marketing services to Nvidia Singapore Pte Ltd	Japan	100	100	85	85

The subsidiary does not require an audit in accordance with the laws in the country of its incorporation.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***14. Trade and other payables**

	27/01/2019	28/01/2018
	US\$'000	US\$'000
Trade payable		
- Immediate holding corporation	1,553,630	1,157,464
	1,553,630	1,157,464
Non-trade payables		
- Immediate holding corporation	4,745	4,457
- Ultimate holding corporation	15	20,197
- Related corporations	88,394	77,065
	93,154	101,719
Accrued operating expenses	286,785	170,541
Other payables	4,274	5,226
	291,059	175,767
	1,937,843	1,434,950

The non-trade payables to immediate holding corporation, ultimate holding corporation and related corporations are unsecured, interest-free and are repayable on demand.

15. Share capital

The Company's share capital comprise fully paid-up 2 (2018: 2) ordinary shares with no par value, amounting to a total of US\$1,000 (2018: US\$1,000).

16. Other reserves

	27/01/2019	28/01/2018
	US\$'000	US\$'000
Beginning of financial year	12,120	10,425
Employee share-based payment scheme		
- Value of employee services	4,050	1,695
End of financial year	16,170	12,120

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

17. Share based compensation

The employees of the Company are eligible for share-based compensation under equity-settled, shared based compensation plans operated by Nvidia Corporation, the ultimate holding corporation of the Company. Awards include share options, restricted share units ("RSUs"), and employee share purchase plan ("ESPP"), are granted under the following plans:

Amended and Restated 2007 Equity Incentive Plan

The Nvidia Corporation 2007 Equity Incentive Plan was approved in 2007, and subsequently amended and restated in 2012, 2013 and 2014, or the Restated 2007 Plan. This plan authorizes the issuance of share options and restricted share units.

Share options granted to employees, subject to certain exceptions, vest over a four year period subject to continued service, and generally expire ten years from the date of grant.

Subject to certain exceptions, RSUs granted to employees vest over a four year period, subject to continued service.

Amended and Restated 2012 Employee Stock Purchase Plan

The Nvidia Corporation 2012 Employee Share Purchase Plan was approved in 2012, and subsequently amended and restated in 2014, or the Restated 2012 Plan, as the successor to the 1998 Employee Share Purchase Plan.

Employees who participate in an offering may have up to 10% of their earnings withheld to the purchase of shares of common stock. The Board may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our ESPP will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the purchase date of each offering period. Employees may end their participation in the ESPP at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded.

The fair value of share option awards on the date of grant is determined using the Binomial model.

Fair value of RSUs is determined using the closing trading price of common stock on the date of grant, minus a dividend yield discount.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***17. Share based compensation (continued)**

The following table summarises the number and weighted average fair value of ESPP granted during the period:

	2019	2018
Number of shares issued under the plan to participating Nvidia Singapore Pte Ltd's employees on 27 January 2019 (28 January 2018)	5,361	27,359

The weighted average market price during the year ended 27 January 2019 was US\$259.60 (2018: US\$133.89) and the shares had an average grant date fair value of US\$138.06 (2018: US\$23.23).

The fair value of shares issued under the ESPP has been estimated at the date of grant with the following assumptions, using the Black-Scholes model:

	2019	2018
Weighted average expected life (years)	0.1-2.0	0.5-2.0
Risk free interest rate	1.6%-2.8%	0.8%-1.4%
Volatility	24%-75%	40%-54%
Dividend yield	0.3%-0.4%	0.3%-0.5%

Nvidia Corporation uses the implied volatility as it is expected to be more reflective of market conditions and, therefore, could reasonably be expected to be a better indicator of expected volatility than historical volatility. The risk-free interest rate is based upon observed interest rates on Treasury bills appropriate for the term of employee share options.

Dividend yield is based on history and expectation of dividend pay-outs. RSU awards are not eligible for cash dividends prior to vesting; therefore, the fair value of RSUs is discounted by dividend yield. For awards granted on or subsequent to 8 November 2012, Nvidia Corporation uses a dividend yield at grant date based on the per share dividends declared during the most recent quarter.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***17. Share based compensation (continued)**

A reconciliation of share options and RSU movements for the financial periods ended 27 January 2019 and 28 January 2018 is shown below (average exercise price and fair value reported in US dollars):

Share-based Payment Award Activity

The following table summarises activity for share options:

	<u>Number of share options</u>	<u>Weighted average exercise price</u>
27 January 2019		
Outstanding at beginning of the year	31,646	\$14.67
Exercised*	(2,266)	\$15.49
Forfeited/Cancel/Transfer	22,350	\$14.24
Outstanding at end of the year	<u>51,730</u>	<u>\$14.45</u>
Options exercisable at year end	<u>51,730</u>	<u>\$14.45</u>

* The weighted average share price at the date of exercise of options exercised during the year ended 27 January 2019 was US\$261.93 (2018: US\$171.86). No options were granted during the financial years ended 27 January 2019.

	<u>Number of share options</u>	<u>Weighted average exercise price</u>
28 January 2018		
Outstanding at beginning of the year	33,869	\$14.64
Exercised*	(2,223)	\$14.24
Outstanding at end of the year	<u>31,646</u>	<u>\$14.67</u>
Options exercisable at year end	<u>31,646</u>	<u>\$14.67</u>

* The weighted average share price at the date of exercise of options exercised during the year ended 29 January 2018 was US\$47.04. No options were granted during the financial years ended 29 January 2018.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***17. Share based compensation (continued)****Range of exercise price details of awards outstanding as at 27 January 2019:**

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	36,700	3.32
US\$15.01-US\$20.00	15,030	3.26
	<u>51,730</u>	

Range of exercise price details of awards outstanding as at 28 January 2018:

Range of exercise prices – US\$	Outstanding options	Weighted average remaining contractual life (years)
US\$10.01-US\$15.00	21,600	4.50
US\$15.01-US\$20.00	10,046	4.32
	<u>31,646</u>	

Restricted Share Units ("RSUs") Activity

The following table summarises activity for restricted share units:

	Number of RSUs	Weighted average grant date fair value
27 January 2019		
Outstanding at beginning of the year	68,273	\$61.60
Granted	30,943	\$229.05
Vested	(32,098)	\$45.89
Forfeited/Cancelled	6,303	\$196.92
Outstanding/non-vested at end of the year	<u>73,421</u>	<u>\$138.24</u>

	Number of RSUs	Weighted average grant date fair value
28 January 2018		
Outstanding at beginning of the year	67,165	\$30.77
Granted	14,223	\$169.15
Vested	(28,000)	\$28.67
Forfeited/Cancelled	14,885	\$79.53
Outstanding/non-vested at end of the year	<u>68,273</u>	<u>\$61.60</u>

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***18. Commitments**Operating lease commitments

The future minimum lease payable under non-cancellable operating leases contracted for at the balance sheet date but not recognised as liabilities are as follows:

	27/01/2019 US\$'000	28/01/2018 US\$'000
Not later than one year	571	544
Later than one year but not later than five years	194	765
	<u>765</u>	<u>1,309</u>

19. Financial risk managementFinancial risk factors

The Company's activities expose it to market risk (including currency risk, price risk and interest rate), credit risk and liquidity risk.

The management team is responsible for setting the objectives and underlying principles of financial risk management for the Company, and establishes detailed policies such as risk identification and measurement, exposure limits and hedging strategies. Financial risk management is carried out by finance personnel.

The finance personnel measure actual exposures against the limits set and prepare regular reports for the review of the management team. The information presented below is based on information received by key management.

(a) Market risk**(i) Currency risk**

The Company's revenue, cost of operations and majority of the financial assets and liabilities are primarily in United States Dollar ("USD"). The Company is not exposed to any significant currency risk. The Company did not enter into currency forward contracts to hedge this exposure.

(ii) Price risk

The Company has insignificant exposure to equity price risk as it does not hold any equity financial assets.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***19. Financial risk management (continued)****(b) Credit risk**

Credit risk refers to the risk that a counterparty will default on its contractual obligations resulting in financial loss to the Company.

(i) *Risk management*

The Company adopts the following policy to mitigate the credit risk.

For banks and financial institutions, the Company mitigates its credit risks by transacting only with counterparties who highly-rated by independent rating agencies.

For external customers, the Company adopts the policy of dealing only with customers of appropriate credit history, and obtaining sufficient collateral where appropriate to mitigate credit risk. In addition, the Company monitors its credit risk on an ongoing basis by reviewing the debtors' aging to minimise its exposure to credit risk.

Credit exposure to an individual customer is restricted by the credit limit approved by the credit controller. Customers' payment profile and credit exposure are continuously monitored by the credit controller and reported to the management and Board of Directors. The Company's trade receivables include 5 (2018: 5 debtors) that represented 42.7% and 40.7% of trade receivables at balance sheet date, respectively.

For intercompany receivables, the estimated lifetime credit losses is immaterial to the financial statements.

(ii) *Credit rating*

The Company uses the following categories of internal credit risk rating for financial assets which are subject to expected credit losses under the 3-stage general approach. These four categories reflect the respective credit risk and how the loss provision is determined for each of those categories.

Category of internal credit rating	Definition of category	Basis for recognition of expected credit losses
Performing	Low risk of default and a strong capacity to meet contractual cash flows	12-month expected credit losses
Underperforming	Significant increase in credit risk since initial recognition	Lifetime expected credit losses
Non-performing	Evidence indicating that the asset is impaired (*)	Lifetime expected credit losses
Write-off	No reasonable expectation of recovery	Asset is written-off

(*) Evidence such as significant difficulty, breach of contract and indicators of potential bankruptcy or other financial reorganisation.

NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 27 January 2019

19. Financial risk management (continued)

(b) Credit risk (continued)

(iii) Impairment of financial assets

All of the Company's financial assets are subject to immaterial credit losses where the expected credit loss model has been applied. The Company has applied the simplified approach by using the provision matrix to measure the lifetime expected credit losses for trade receivables from non-related customers.

To measure the expected credit losses, these receivables have been grouped based on shared credit risk characteristics and days past due. In calculating the expected credit loss rates, the Company considers historical loss rates for each category of customers, and adjusts for forward-looking macroeconomic data. The Company has identified the Gross Domestic Product ("GDP") of the countries in which it sell its goods to be the most relevant factor. There are no adjustments to historical loss rates based on expected changes in the factor.

Receivables are written off when there is no reasonable expectation of recovery, such as a debtor failing to engage in a repayment plan with the Company. There has been no historical trend of write off. Where receivables have been written off, the Company continues to engage in enforcement activity to attempt to recover the receivables due. Where recoveries are made, these are recognised in profit or loss.

The Company's credit risk exposure in relation to trade receivables from customers as at 27 January 2019 is minimal with all trade receivables at current.

	← Past due →				
	Current	Within 30 days	30 to 60 days	More than 60 days	Total
	\$'000	\$'000	\$'000	\$'000	\$'000
27 January 2019					
Expected loss rates	-%	-%	-%	-%	
Trade receivables	1,183,836	-	-	-	1,183,836
Loss allowances	(1,944)	-	-	-	(1,944)
	Current	Within 30 days	30 to 60 days	More than 60 days	Total
	\$'000	\$'000	\$'000	\$'000	\$'000
28 January 2018					
Expected loss rates	-%	-%	-%	-%	
Trade receivables	939,851	-	-	-	939,851
Loss allowances	(2,607)	-	-	-	(2,607)

NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 27 January 2019

19. Financial risk management (continued)

(b) Credit risk (continued)

(iii) Impairment of financial assets (continued)

The Company's credit risk exposure in relation to trade receivables under FRS 39 as at 28 January 2018 are set out as follows:

	←	Within 30 days \$'000	30 to 60 days \$'000	Past due More than 60 days \$'000	→ Total \$'000
Trade receivables					
Gross carrying amount:					
- Not past due		-	-	-	939,851
					939,851
Less: Allowances for impairment					(2,607)
Net carrying amount					937,298

In 2018, the impairment of the financial assets was assessed based on the incurred loss impairment model. Individual receivables which were known to be uncollectible were written off by reducing the carrying amount directly.

The other receivables were assessed collectively, to determine whether there was objective evidence that an impairment had been incurred but not yet identified.

The Company considered that there was evidence if any of the following indicators were present:

- There is significant difficulty of the debtor.
- Breach of contract, such as default or past due event
- It is becoming probable that the debtor will enter bankruptcy or other financial reorganisation

Financial assets that are neither past due nor impaired

Cash and bank balances that are neither past due nor impaired are mainly deposits with banks which have high credit-ratings as determined by international credit-rating agencies. Trade and other receivables and deposits that are neither past due nor impaired are substantially companies with good collection track records with the Company.

There are no credit loss allowance for other financial asset at amortised cost as at 27 January 2019.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***19. Financial risk management (continued)****(c) Liquidity risk**

The Company manage the liquidity risk by maintaining sufficient cash and bank balances to enable it to meet its operational requirements.

(d) Capital risk

The Company's objectives when managing capital are to ensure that the Company is adequately capitalised and to maintain an optimal capital structure.

The Company is not subject to any externally imposed capital requirements.

(e) Financial instruments by category

The carrying amounts of financial assets measured at fair value through profit or loss are disclosed on the face of the balance sheet. The aggregate carrying amounts of loans and receivables and financial liabilities at amortised cost are as follows:

	27/01/2019 US\$'000
Financial assets, at amortised cost	1,353,303
Financial liabilities, at amortised cost	<u>1,937,459</u>
	28/01/2018 US\$'000
Loans and receivables	1,138,248
Financial liabilities, at amortised cost	<u>1,434,659</u>

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***19. Financial risk management (continued)****(f) Offsetting financial assets and financial liabilities****(i) Financial assets**

The Company has the following financial instrument subject to enforceable master netting arrangement or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial assets (a) US\$'000	Gross amounts - financial liabilities (b) US\$'000	Net amounts - financial assets presented in the balance sheet (c)=(a)-(b) US\$'000	Financial assets (d) US\$'000	Net amount (e)=(c)+(d) US\$'000
As at 27 January 2019					
Trade and other receivables	213,505	143,744	69,761	96,952	166,713
Total	213,505	143,744	69,761	96,952	166,713
As at 28 January 2018					
Trade and other receivables	211,720	100,149	111,571	81,925	193,496
Total	211,720	100,149	111,571	81,925	193,496

(ii) Financial liabilities

The Company has the following financial instruments subject to enforceable master netting arrangements or similar agreement as follows:

	<u>Related amounts set off</u>			<u>Related amounts not set off</u>	
	Gross amounts - financial liabilities (a) US\$'000	Gross amounts - financial assets (b) US\$'000	Net amounts - financial liabilities presented in the balance sheet (c)=(a)-(b) US\$'000	Financial liabilities (d) US\$'000	Net amount (e)=(c)+(d) US\$'000
As at 27 January 2019					
Trade and other payables	1,975,793	422,163	1,553,630	93,154	1,646,784
Total	1,975,793	422,163	1,553,630	93,154	1,646,784
As at 28 January 2018					
Trade and other payables	1,564,710	407,246	1,157,464	101,719	1,259,183
Total	1,564,710	407,246	1,157,464	101,719	1,259,183

20. Immediate and ultimate holding corporations

The Company's immediate holding corporation is Nvidia International Inc., incorporated in the Cayman Islands. The Company's ultimate holding corporation is Nvidia Corporation, incorporated in United States of America.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019***21. Related party transactions**

In addition to the information disclosed elsewhere in the financial statements, the following transactions took place between the Company and related parties at terms agreed between the parties:

(a) Transactions

	29/01/2018 to 27/01/2019 US\$'000	30/01/2017 to 28/01/2018 US\$'000
Purchases from immediate holding company	8,436,643	6,967,070
Payments made on behalf of fellow subsidiaries	1,780	-
Sales of goods to a fellow subsidiary	-	1,470
Marketing and administrative services fees charged by related corporations	246,944	210,571

The Company participates in the centralised cash pooling arrangement with Nvidia Corporation, its ultimate holding company. During the year, certain balances with related companies were settled and netted off through the cash pooling arrangement.

(b) Key management personnel compensation

There are no key management remuneration for the financial years ended 27 January 2019 and 28 January 2018 as the key management having authority and responsibility for planning, directing and controlling the activities of the Company are employed by related corporations.

22. New or revised accounting standards and interpretations

Below are the mandatory standards, amendments and interpretations to existing standards that have been published, and are relevant for the Group's accounting periods beginning on or after 28 January 2019 and which the Group has not early adopted:

(a) FRS 116 Leases (effective for annual periods beginning on or after 1 January 2019)

FRS 116 will result in almost all leases being recognised on the balance sheet, as the distinction between operating and finance leases is removed. Under the new standard, an asset (the right to use the leased item) and a financial liability to pay rentals are recognised.

NVIDIA SINGAPORE PTE LTD**NOTES TO FINANCIAL STATEMENTS***For the financial year ended 27 January 2019*

22. New or revised accounting standards and interpretations (continued)

- (a) FRS 116 *Leases* (effective for annual periods beginning on or after 1 January 2019) (continued)

The only exceptions are short-term and low-value leases. The accounting for lessors will not change significantly.

As at the reporting date, the Company has non-cancellable operating lease commitments of \$765,200 (Note 18). Of these commitments, none of these operating leases relate to a short-term lease which will be recognised on a straight-line basis as expense in profit or loss.

For the remaining lease commitments the Company expects that the impact on net current assets, net profit after tax and cash flows to be insignificant to the financial statements.

- (b) INT FRS 123 *Uncertainty Over Income Tax Treatments* (effective for annual periods beginning on or after 1 January 2019)

The interpretation explains how to recognise and measure deferred and current income tax assets and liabilities where there is uncertainty over a tax treatment. In particular, it discusses:

- i) how to determine the appropriate unit of account, and that each uncertain tax treatment should be considered separately or together as a group, depending on which approach better predicts the resolution of the uncertainty;
- ii) that the entity should assume a tax authority will examine the uncertain tax treatments and have full knowledge of all related information, i.e. that detection risk should be ignored
- iii) that the entity should reflect the effect of the uncertainty in its income tax accounting when it is not probable that the tax authorities will accept the treatment
- iv) that the impact of the uncertainty should be measured using either the most likely amount or the expected value method, depending on which method better predicts the resolution of the uncertainty, and
- v) that the judgements and estimates made must be reassessed whenever circumstances have changed or there is new information that affects the judgements.

The Company does not expect additional tax liability to be recognised arising from the uncertain tax positions on the adoption of the interpretation on 28 January 2019.

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NVIDIA SINGAPORE PTE LTD

NOTES TO FINANCIAL STATEMENTS

For the financial year ended 27 January 2019

23. Authorisation of financial statements

These financial statements were authorised for issue in accordance with a resolution of the Board of Directors of Nvidia Singapore Pte Ltd on

27 JUN 2019

Exhibit Q

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended January 27, 2019

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

Commission file number: 0-23985



NVIDIA CORPORATION

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
Incorporation or Organization)

94-3177549
(I.R.S. Employer
Identification No.)

2788 San Tomas Expressway
Santa Clara, California 95051
(408) 486-2000

(Address, including zip code, and telephone number, including area code, of principal executive offices)
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, \$0.001 par value per share	The Nasdaq Global Select Market

Securities registered pursuant to Section 12(g) of the Act:

None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.

Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See definitions of "large accelerated filer", "accelerated filer", "smaller reporting company", and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐ Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of the voting stock held by non-affiliates of the registrant as of July 27, 2018 was approximately \$146.66 billion (based on the closing sales price of the registrant's common stock as reported by the Nasdaq Global Select Market on July 27, 2018). This calculation excludes 26 million shares held by directors and executive officers of the registrant. This calculation does not exclude shares held by such organizations whose ownership exceeds 5% of the registrant's outstanding common stock that have represented to the registrant that they are registered investment advisers or investment companies registered under section 8 of the Investment Company Act of 1940.

The number of shares of common stock outstanding as of February 15, 2019 was 606 million.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for its 2019 Annual Meeting of Shareholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K are incorporated by reference into Part III, Items 10-14 of this Annual Report on Form 10-K.

**NVIDIA CORPORATION
TABLE OF CONTENTS**

	<u>Page</u>
<u>PART I</u>	
Item 1. Business	4
Item 1A. Risk Factors	12
Item 1B. Unresolved Staff Comments	19
Item 2. Properties	19
Item 3. Legal Proceedings	20
Item 4. Mine Safety Disclosures	20
<u>PART II</u>	
Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	20
Item 6. Selected Financial Data	23
Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations	23
Item 7A. Quantitative and Qualitative Disclosures About Market Risk	34
Item 8. Financial Statements and Supplementary Data	35
Item 9. Changes in and Disagreements With Accountants on Accounting and Financial Disclosure	35
Item 9A. Controls and Procedures	35
Item 9B. Other Information	36
<u>PART III</u>	
Item 10. Directors, Executive Officers and Corporate Governance	36
Item 11. Executive Compensation	37
Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	37
Item 13. Certain Relationships and Related Transactions, and Director Independence	37
Item 14. Principal Accounting Fees and Services	37
<u>PART IV</u>	
Item 15. Exhibits, Financial Statement Schedules	38
Signatures	79

WHERE YOU CAN FIND MORE INFORMATION

Investors and others should note that we announce material financial information to our investors using our investor relations website, press releases, SEC filings and public conference calls and webcasts. We also use the following social media channels as a means of disclosing information about the company, our products, our planned financial and other announcements and attendance at upcoming investor and industry conferences, and other matters and for complying with our disclosure obligations under Regulation FD:

NVIDIA Twitter Account (<https://twitter.com/nvidia>)

NVIDIA Company Blog (<http://blogs.nvidia.com>)

NVIDIA Facebook Page (<https://www.facebook.com/nvidia>)

NVIDIA LinkedIn Page (<http://www.linkedin.com/company/nvidia>)

NVIDIA Instagram Page (<https://www.instagram.com/nvidia>)

In addition, investors and others can view NVIDIA videos on YouTube.

The information we post through these social media channels may be deemed material. Accordingly, investors should monitor these accounts and the blog, in addition to following our press releases, SEC filings and public conference calls and webcasts. This list may be updated from time to time. The information we post through these channels is not a part of this Annual Report on Form 10-K. These channels may be updated from time to time on NVIDIA's investor relations website.

Forward-Looking Statements

This Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which are subject to the "safe harbor" created by those sections. Forward-looking statements are based on our management's beliefs and assumptions and on information currently available to our management. In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "could," "goal," "would," "expect," "plan," "anticipate," "believe," "estimate," "project," "predict," "potential" and similar expressions intended to identify forward-looking statements. These statements involve known and unknown risks, uncertainties and other factors, which may cause our actual results, performance, time frames or achievements to be materially different from any future results, performance, time frames or achievements expressed or implied by the forward-looking statements. We discuss many of these risks, uncertainties and other factors in this Annual Report on Form 10-K in greater detail under the heading "Risk Factors." Given these risks, uncertainties and other factors, you should not place undue reliance on these forward-looking statements. Also, these forward-looking statements represent our estimates and assumptions only as of the date of this filing. You should read this Annual Report on Form 10-K completely and with the understanding that our actual future results may be materially different from what we expect. We hereby qualify our forward-looking statements by these cautionary statements. Except as required by law, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future.

All references to "NVIDIA," "we," "us," "our" or the "Company" mean NVIDIA Corporation and its subsidiaries.

In addition, statements that "we believe" and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the filing date of this Annual Report on Form 10-K, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements.

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PART I

ITEM 1. BUSINESS

Our Company

Starting with a focus on PC graphics, NVIDIA invented the graphics processing unit, or GPU, to solve some of the most complex problems in computer science. We have extended our focus in recent years to the revolutionary field of artificial intelligence, or AI. Fueled by the sustained demand for better 3D graphics and the scale of the gaming market, NVIDIA has evolved the GPU into a computer brain at the intersection of virtual reality, or VR, high performance computing, or HPC, and AI.

The GPU was initially used to simulate human imagination, enabling the virtual worlds of video games and films. Today, it also simulates human intelligence, enabling a deeper understanding of the physical world. Its parallel processing capabilities, supported by up to thousands of computing cores, are essential to running deep learning algorithms. This form of AI, in which software writes itself by learning from data, can serve as the brain of computers, robots and self-driving cars that can perceive and understand the world. GPU-powered deep learning continues to be adopted by thousands of enterprises to deliver services and features that would have been impossible with traditional coding.

NVIDIA has a platform strategy, bringing together hardware, system software, programmable algorithms, libraries, systems, and services to create unique value for the markets we serve. While the requirements of these end markets are diverse, we address them with a unified underlying architecture leveraging our GPUs and Compute Unified Device Architecture, or CUDA, as the fundamental building blocks. The programmable nature of our architecture allows us to support several multi-billion dollar end markets with the same underlying technology by using a variety of software stacks developed either internally or by third party developers and partners. The large and growing number of developers across our platforms strengthens our ecosystem and increases the value of our platform to our customers.

Innovation is at our core. We have invested over \$17 billion in research and development since our inception, yielding inventions that are essential to modern computing. Our invention of the GPU in 1999 defined modern computer graphics and established NVIDIA as the leader in visual computing. With our introduction of the CUDA programming model in 2006, we opened the parallel processing capabilities of the GPU for general purpose computing. This approach significantly accelerates the performance of the most demanding applications in HPC in fields such as aerospace, bio-science research, mechanical and fluid simulations, and energy exploration. Today, our GPUs power the fastest supercomputers across the world. In addition, the massively parallel compute architecture of our GPUs and associated software have proven to be well suited for deep learning and are now expanding into machine learning, powering the era of AI. As the laws of physics have begun to slow down Moore's Law, we continue to deliver GPU performance improvements ahead of Moore's Law, giving the industry a path forward.

Gamers choose NVIDIA GPUs to enjoy immersive, increasingly cinematic virtual worlds. GPUs also help underpin the world's fastest growing spectator sport, eSports, which attracts hundreds of millions of viewers to watch top-quality gaming. A rapidly growing new genre of Battle Royale games, such as Fortnite, is also expanding the gaming market.

Researchers use our GPUs to accelerate a wide range of important applications, from simulating viruses to exploring the origins of the universe. With support for more than 550 applications - including the top 15 HPC applications - NVIDIA GPUs enable some of the most promising areas of discovery, from weather prediction to materials science and from wind tunnel simulation to genomics. In 2018, NVIDIA GPUs powered the top two supercomputers in the world, located at Oak Ridge and Lawrence Livermore National Laboratories in the United States, as well as the top supercomputers in Europe and Japan. Five of the six finalists for the Gordon Bell Prize, awarded by the Association for Computing Machinery for outstanding achievement in the field of computing for applications in science, engineering and large-scale data science, did their work on the NVIDIA-powered top-two supercomputers.

The world's leading cloud service providers use our GPUs to enable, accelerate or enrich the services they deliver to billions of end-users, including search, social networking, online shopping, live video, translation, AI assistants, navigation, and cloud computing.

A rapidly growing number of enterprises and startups use our GPUs to facilitate deep learning that meets, and in several cases surpasses, human perception, in fields ranging from radiology to precision agriculture. For example, the transportation industry is turning to our GPUs and AI to enable autonomous vehicles, or AVs, with several hundred companies and organizations working with NVIDIA's DRIVE platform.

Professional designers use our GPUs to create visual effects in movies and design products ranging from soft drink bottles to commercial aircraft.

Headquartered in Santa Clara, California, NVIDIA was incorporated in California in April 1993 and reincorporated in Delaware in April 1998.

Our Businesses

Our two reportable segments - GPU and Tegra Processor - are based on a single underlying architecture. Our GPU product brands are aimed at specialized markets including GeForce for gamers; Quadro for designers; Tesla and DGX for AI data scientists and big data researchers; and GRID for cloud-based visual computing users. Our Tegra brand integrates an entire computer onto a single chip, and incorporates GPUs and multi-core CPUs to drive supercomputing for autonomous robots, drones, and cars, as well as for game consoles and mobile gaming and entertainment devices.

GPU

- **GeForce** for PC gaming and mainstream PCs
- **GeForce NOW** for cloud-based game-streaming service
- **Quadro** for design professionals working in computer-aided design, video editing, special effects, and other creative applications
- **Tesla** for AI utilizing deep learning and accelerated computing, leveraging the parallel computing capabilities of GPUs for general purpose computing
- **GRID** to provide the power of NVIDIA graphics through the cloud and datacenters
- **DGX** for AI scientists, researchers and developers

Tegra Processor

- **Tegra** processors are primarily designed to enable branded platforms - DRIVE and SHIELD
- **DRIVE AGX** automotive supercomputers and software stacks that provide self-driving capabilities
- **Clara AGX** for intelligent medical instruments
- **SHIELD** devices and services designed to harness the power of mobile-cloud to revolutionize home entertainment, AI and gaming
- **Jetson AGX** is a power-efficient AI computing platform for robotics and other embedded use

Our Markets

We specialize in markets in which GPU-based visual computing and accelerated computing platforms can provide tremendous throughput for applications. These platforms incorporate processors, systems software, programmable algorithms, systems, and services to deliver value that is unique in the marketplace. From our proprietary processors, we have created platforms that address four large markets where our expertise is critical: Gaming, Professional Visualization, Datacenter, and Automotive.

Gaming

Computer gaming is the largest entertainment industry. Many factors propel computer gaming's growth, including new high production value games and franchises, the rise of competitive online gaming, eSports, and the rise of virtual and augmented reality.

Our GPUs enhance the gaming experience by improving the visual quality of graphics, increasing the frame rate for smoother gameplay and improving realism by incorporating the behavior of light and physical objects. These can be enjoyed independently or together to extend the gaming experience across platforms.

Our gaming platforms utilize sophisticated 3D software and algorithms, including our GameWorks libraries that provide special effects for games. We further enhance gaming with GeForce Experience, our gaming application that optimizes the PC user's settings for each title and enables players to record and share gameplay. It has been downloaded by more than 100 million users.

To enable VR, we provide developers with a suite of software libraries called VRWorks. VRWorks allows developers to create fully immersive experiences by enabling physically realistic visuals, sound, touch interactions, and simulated environments. VR requires advanced high-performance GPUs as the engine to simulate complete immersion.

Our products for the gaming market include GeForce RTX and GeForce GTX GPUs for PC gaming, SHIELD devices for gaming and streaming, GeForce NOW for cloud-based gaming, as well as platforms and development services for specialized console gaming devices.

Professional Visualization

We serve the Professional Visualization market by working closely with independent software vendors to optimize their offerings for NVIDIA GPUs. Our GPU computing solutions enhance productivity and introduce new capabilities for critical parts of the workflow for such major industries as automotive, media and entertainment, architectural engineering, oil and gas, and medical imaging.

Designers who build the products we use every day need the images that they view digitally to mirror reality. This requires simulating the physical behavior of light and materials, or physically-based rendering, an emerging trend in professional design. Our DesignWorks software delivers this to designers and enables an architect designing a building with a computer-aided design package to interact with the model in real time, view it in greater detail, and generate photorealistic renderings for the client. It also allows an automotive designer to create a highly realistic 3D image of a car, which can be viewed from all angles, reducing reliance on costly, time-consuming full-scale clay models.

Just as VR is becoming more important in gaming, it is also being incorporated in a growing number of enterprise applications, including within medicine, architecture, product design, and retail. Virtual car showrooms, surgical training, architectural walkthroughs, and bringing historical scenes to life all deploy this technology, powered by our GPUs.

Visual computing is vital to productivity in many environments, including design and manufacturing and digital content creation. Design and manufacturing includes computer-aided design, architectural design, consumer-products manufacturing, medical instrumentation, and aerospace. Digital content creation includes professional video editing and post production, special effects for films, and broadcast-television graphics.

Our brand for this market is Quadro for workstations. Quadro GPUs enhance the productivity of designers by improving performance and adding functionality, such as photorealistic rendering, high color fidelity, and advanced scalable display capabilities. During fiscal year 2019, we introduced the NVIDIA RTX platform, making it possible to render film-quality, photorealistic objects and environments with physically accurate shadows, reflections and refractions using ray tracing in real-time.

Datacenter

The NVIDIA accelerated computing platform addresses AI and HPC applications. The platform consists of our energy efficient GPUs, our CUDA programming language, specific libraries such as cuDNN and TensorRT, and innovations such as NVLink, which enables application scalability across multiple GPUs.

In the field of AI, NVIDIA's platform accelerates both deep learning and machine learning workloads. Deep learning is a computer science approach where neural networks are trained to recognize patterns from massive amounts of data in the form of images, sounds and text - in some instances better than humans. Machine learning is a related approach that leverages algorithms as well as data to learn how to make determinations or predictions, often used in data science. HPC, also referred to as scientific computing, uses numerical computational approaches to solve large and complex problems. For both AI and HPC applications, the NVIDIA accelerated computing platform greatly increases the performance and power efficiency of high-performance computers and datacenters, as GPUs excel at parallel workloads. For example, an NVIDIA GPU-accelerated machine learning cluster for data science is 1/8 the cost, 1/15 the space, and 1/18 the power of a traditional CPU-based cluster.

We are engaged with thousands of organizations working on AI in a multitude of industries, from automating tasks such as reading medical images, to enabling fraud detection in financial services, to optimizing oil exploration and drilling. These organizations include the world's leading cloud services companies such as Amazon, Baidu, and Facebook, which are infusing AI in applications that enable highly accurate voice recognition and real-time translation; enterprises that are increasingly turning to AI to improve products and services; and startups seeking to implement AI in transformative ways across multiple industries. We have partnered with industry leaders such as IBM, Microsoft, Oracle, and SAP to bring AI to enterprise users. We also have partnerships in healthcare and manufacturing, among others, to accelerate the adoption of AI.

To enable deep learning and machine learning, we provide a family of GPUs designed to speed up training and inferencing of neural networks. They are available in industry standard servers from every major computer maker worldwide, including Cisco, Dell, HP, Inspur, and Lenovo; from every major cloud service provider such as Alicloud, Amazon Web Services, Baidu Cloud, Google Cloud, IBM Cloud, Microsoft Azure, and Oracle Cloud; as well as in our DGX AI supercomputer, a purpose-built system for deep learning and GPU accelerated applications. DGX delivers performance equal to hundreds of conventional servers, comes fully integrated with hardware, software, development tools, support for AI frameworks, and runs popular accelerated applications. We also offer the NVIDIA GPU Cloud, or NGC, a comprehensive catalog of easy-to-use, optimized software stacks across a range of domains including scientific computing, deep learning, and machine learning. With NGC,

AI developers, researchers and data scientists can get started with the development of AI and HPC applications and deploy them on DGX systems, NGC-ready workstations or servers from our systems partners, or with NVIDIA's cloud partners such as Amazon, Google Cloud, Microsoft Azure, or Oracle Cloud.

GPUs also increase the speed of applications used in such fields as aerospace, bio-science research, mechanical and fluid simulations, and energy exploration. They have already had a significant impact on scientific discovery, including improving heart surgery, mapping human genome folds, seismic modeling, and weather simulations.

Accelerated computing is recognized as the path forward for computing amid the slowing of Moore's Law. The proportion of supercomputers utilizing accelerators has grown sharply over the past five years, now accounting for a significant proportion of both the total systems on the TOP500 list, which ranks the 500 most powerful commercially available computer systems, and the list's total floating-point operations per second. Tesla GPU accelerators power many of the world's fastest supercomputers, including the U.S. Department of Energy's new generation of supercomputers, Summit and Sierra, at Oak Ridge and Lawrence Livermore National Laboratories, Europe's fastest supercomputer - Piz Daint - in Switzerland, and Japan's fastest supercomputer, ABCI.

We also serve the datacenter market with GRID for virtualized graphics. GRID makes it possible to run graphics-intensive applications remotely on a server in the datacenter. Applications include accelerating virtual desktop infrastructures and delivering graphics-intensive applications from the cloud for industries such as manufacturing, healthcare, and educational institutions, among others.

Automotive

NVIDIA's Automotive market is comprised of cockpit infotainment solutions, AV platforms, and associated development agreements. Leveraging our technology leadership in AI and building on our long-standing automotive relationships, we are delivering a full solution for the AV market under the DRIVE brand. NVIDIA has demonstrated multiple applications of AI within the car. AI can drive the car itself as a pilot, in either partial or fully autonomous mode. AI can also be a co-pilot, assisting the human driver in creating a safer driving experience.

NVIDIA is working with several hundred partners in the automotive ecosystem including automakers, truck makers, tier-one suppliers, sensor manufacturers, automotive research institutions, HD mapping companies, and startups to develop and deploy AI systems for self-driving vehicles. Our unified AI computing architecture starts with training deep neural networks using our Tesla GPUs, and then running them within the vehicle on the NVIDIA DRIVE computing platform. The platform consists of high-performance, energy efficient hardware - DRIVE AGX, and open, modular software - including DRIVE AV for autonomous driving and DRIVE IX for in-vehicle AI assistance. In addition, we offer a scalable simulation solution, NVIDIA DRIVE Constellation, for testing and validating a self-driving platform before commercial deployment. This end-to-end, software-defined approach allows cars to receive over-the-air updates to add new features and capabilities throughout the life of a vehicle.

NVIDIA DRIVE can perceive and understand in real-time what's happening around the vehicle, precisely locate itself on an HD map, and plan a safe path forward. This advanced self-driving car platform combines deep learning, sensor fusion, and surround vision to change the driving experience. Our DRIVE platform scales from a palm-sized, energy-efficient module for automated highway-driving capabilities to a configuration with multiple systems aimed at enabling driverless cars. Our Xavier SoC, which started shipping in 2018, enables vehicles to use deep neural networks to process data from multiple cameras and sensors. It powers the DRIVE AutoPilot, the first commercially available Level 2+ automated driving system, combining the DRIVE AV self-driving solution with the DRIVE IX cockpit software, including a visualization system for allowing the driver to see what the car sees and plans to do.

Business Strategies

NVIDIA's key strategies that shape our overall business approach include:

Advancing the GPU computing platform. The massive parallel processing capabilities of NVIDIA GPUs can solve complex problems in significantly less time and with lower power consumption than alternative computational approaches. Indeed, GPUs can help solve problems that were previously deemed unsolvable. We work to deliver continued GPU performance leaps that outpace Moore's Law by leveraging innovation across the architecture, chip design, system, and software layers. Our strategy is to target markets where GPUs deliver order-of-magnitude performance advantages relative to legacy approaches. Our target markets so far include gaming, professional visualization, datacenter, and automotive. While the requirements of these end markets are diverse, we address them with a unified underlying architecture leveraging our GPUs and CUDA as the fundamental building blocks. The programmable nature of our architecture allows us to make leveraged investments in R&D: we can support several multi-billion dollar end markets with the same underlying technology

by using a variety of software stacks developed either internally or by third party developers and partners. We utilize this platform approach in each of our target markets.

Extending our technology and platform leadership in AI. We provide a complete, end-to-end GPU computing platform for deep learning and machine learning, addressing both training and inferencing. This includes GPUs, our CUDA programming language, algorithms, libraries, and system software. GPUs are uniquely suited to AI, and we will continue to add AI-specific features to our GPU architecture to further extend our leadership position. Our AI technology leadership is reinforced by our large and expanding ecosystem in a virtuous cycle. Our GPU platforms are available from virtually every major server maker and cloud service provider, as well as on our own AI supercomputer. There are over 1.2 million developers worldwide using CUDA and our other software tools to help deploy our technology in our target markets. We evangelize AI through partnerships with hundreds of universities and more than 3,600 startups through our Inception program. Additionally, our Deep Learning Institute provides instruction on the latest techniques on how to design, train, and deploy neural networks in applications using our accelerated computing platform.

Extending our technology and platform leadership in visual computing. We believe that visual computing is fundamental to the continued expansion and evolution of computing. We apply our research and development resources to extending our leadership in visual computing, enabling us to enhance the user experience for consumer entertainment and professional visualization applications. Our technologies are instrumental in driving gaming forward, as developers leverage our libraries and algorithms to create near-cinematic and VR experiences. Our close collaboration with game developers allows us to deliver an optimized gaming experience on our GeForce platform. Our GeForce Experience gaming application further enhances each gamer's experience by optimizing their PC's settings, as well as enabling the recording and sharing of gameplay. We also enable interactive graphics applications - such as games, movie and photo editing and design software - to be accessed by almost any device, almost anywhere, through our cloud platforms such as GRID for enterprise and GeForce NOW for gaming.

Advancing the leading autonomous vehicle platform. We believe the advent of AV will soon revolutionize the transportation industry. In our view, AI is the key technology enabler of this opportunity, as the algorithms required for autonomous driving - such as perception, localization, and planning - are too complex for legacy hand-coded approaches, and will run on multiple trained neural networks instead. Therefore, we have provided a full functionally safe AI-based hardware and software solution for the AV market under the DRIVE brand, which we are bringing to market through our partnerships with automotive original equipment manufacturers, or OEMs, tier-1 suppliers, and start-ups. Our AV solution also includes the GPU-based hardware required to train the neural networks before their in-vehicle deployment, as well as to re-simulate their operation prior to any over-the-air software updates. We believe our comprehensive, top-to-bottom and end-to-end approach will enable the transportation industry to solve the complex problems arising from the shift to autonomous driving.

Leveraging our intellectual property. We believe our intellectual property is a valuable asset that can be accessed by our customers and partners through licenses and development agreements when they desire to build such capabilities directly into their own products, or have us do so through a custom development. Such license and development arrangements can further enhance the reach of our technology.

Sales and Marketing

Our sales strategy involves working with end customers and various industry ecosystems through our partner network. Our worldwide sales and marketing strategy is key to achieving our objective of providing markets with our high-performance and efficient GPU and embedded system-on-a-chip, or SOC, platforms. Our sales and marketing teams, located across our global markets, work closely with end customers in each industry. Our partner network incorporates each industry's respective OEMs, original device manufacturers, or ODMs, system builders, add-in board manufacturers, or AIBs, retailers/distributors, internet and cloud service providers, automotive manufacturers and tier-1 automotive suppliers, mapping companies, start-ups, and other ecosystem participants.

Members of our sales team have technical expertise and product and industry knowledge. We also employ a team of application engineers to assist our partner network in designing, testing, and qualifying system designs that incorporate our platforms. We believe that the depth and quality of our design support are key to improving our partner network's time-to-market, maintaining a high level of customer satisfaction, and fostering relationships that encourage our end customers and partner network to use the next generation of our products within each platform.

To encourage the development of applications optimized for our GPUs, we seek to establish and maintain strong relationships in the software development community. Engineering and marketing personnel engage with key software developers to promote and discuss our platforms, as well as to ascertain individual product requirements and solve technical problems. Our developer program makes our products available to developers prior to launch in order to encourage the development of AI frameworks, Software Development Kits, and Application Programming Interfaces, or APIs, for software applications and game titles that are optimized for our platforms. Our Deep Learning Institute provides in-person and online training

for developers in industries and organizations around the world to build AI and accelerated computing applications that leverage our GPU and CUDA platforms. We now have over 700 thousand registered developers across our platforms, including accelerated computing, gaming, deep learning, autonomous machines, and others.

As NVIDIA's business has evolved from a focus primarily on gaming products to broader markets, and from chips to platforms and complete systems, so, too, have our avenues to market. Thus, in addition to sales to customers in our partner network, certain of our platforms are also sold through e-tail channels, or direct to cloud service providers and enterprise customers.

Backlog

Our sales are primarily made pursuant to standard purchase orders. The quantity of products purchased by our customers as well as our shipment schedules are subject to revisions that reflect changes in both the customers' requirements and in manufacturing availability. Our industry is characterized by relatively short lead time orders and delivery schedules, thus, we believe that only a small portion of our backlog is non-cancelable and that the dollar amount associated with the non-cancelable portion is not significant.

Seasonality

Our GPU and Tegra processor platforms serve many markets from consumer PC gaming to enterprise workstations to government and cloud service provider datacenters, although a majority of our revenue stems from the consumer industry. Our consumer products have typically seen stronger revenue in the second half of our fiscal year. However, there can be no assurance that this trend will continue; for example, in fiscal year 2019 second half revenue was weaker than the first half.

Manufacturing

We do not directly manufacture semiconductors used for our products. Instead, we utilize a fabless manufacturing strategy, whereby we employ world-class suppliers for all phases of the manufacturing process, including wafer fabrication, assembly, testing, and packaging. This strategy uses the expertise of industry-leading suppliers that are certified by the International Organization for Standardization in such areas as fabrication, assembly, quality control and assurance, reliability, and testing. Additionally, we can avoid many of the significant costs and risks associated with owning and operating manufacturing operations. While we may directly procure certain raw materials used in the production of our products, such as substrates and a variety of components, our suppliers are responsible for procurement of the majority of the raw materials used in the production of our products. As a result, we can focus our resources on product design, additional quality assurance, marketing, and customer support.

We utilize industry-leading suppliers, such as Taiwan Semiconductor Manufacturing Company Limited and Samsung Electronics Co. Ltd, to produce our semiconductor wafers. We then utilize independent subcontractors, such as Advanced Semiconductor Engineering, Inc., Amkor Technology, BYD Auto Co. Ltd., Hon Hai Precision Industry Co., Ltd., JSI Logistics Ltd., King Yuan Electronics Co., Ltd., and Siliconware Precision Industries Company Ltd. to perform assembly, testing, and packaging of most of our products and platforms. We purchase substrates from IbidenCo. Ltd., Kinsus Interconnect Technology Corporation, and Unimicron Technology Corporation, and memory from Micron Technology, Samsung Semiconductor, Inc., and SK Hynix.

We typically receive semiconductor products from our subcontractors, perform incoming quality assurance and configuration, and then ship the semiconductors to contract equipment manufacturers, or CEMs, distributors, motherboard and AIB customers from our third-party warehouse in Hong Kong. Generally, these manufacturers assemble and test the boards based on our design kit and test specifications, and then ship our products to retailers, system builders, or OEMs as motherboard and AIB solutions.

We also utilize industry-leading contract manufacturers, or CMs, such as BYD and Hon Hai Precision Industry Co., and ODMs such as Quanta Computer and Wistron Corporation, to manufacture some of our products for sale directly to end customers. In those cases, key elements such as the GPU, SOC and memory are often consigned by us to the CMs, who are responsible for the procurement of other components used in the production process.

Working Capital

We focus considerable attention on managing our inventories and other working-capital-related items. We manage inventories by communicating with our customers and partners and then using our industry experience to forecast demand on a platform-by-platform basis. We then place manufacturing orders for our products that are based on forecasted demand. We generally maintain substantial inventories of our products because the semiconductor industry is characterized by short lead time orders and quick delivery schedules. A substantial amount of our inventories is maintained as semi-finished products that can be leveraged across a wide range of our processors to balance our customer demands.

Our existing cash, cash equivalents and marketable securities balances increased by 4% to \$7.42 billion at the end of fiscal year 2019 compared with the end of fiscal year 2018.

Competition

The market for our products is intensely competitive and is characterized by rapid technological change and evolving industry standards. We believe that the principal competitive factors in this market are performance, breadth of product offerings, access to customers and partners and distribution channels, software support, conformity to industry standard APIs, manufacturing capabilities, processor pricing, and total system costs. We believe that our ability to remain competitive will depend on how well we are able to anticipate the features and functions that customers and partners will demand and whether we are able to deliver consistent volumes of our products at acceptable levels of quality and at competitive prices. We expect competition to increase from both existing competitors and new market entrants with products that may be less costly than ours, or may provide better performance or additional features not provided by our products. In addition, it is possible that new competitors or alliances among competitors could emerge and acquire significant market share.

A significant source of competition comes from companies that provide or intend to provide GPUs, embedded SOCs, and accelerated and AI computing processor products. Some of our competitors may have greater marketing, financial, distribution and manufacturing resources than we do and may be more able to adapt to customer or technological changes.

Our current competitors include:

- suppliers or licensors of discrete and integrated GPUs and accelerated computing solutions, including chipsets that incorporate 3D graphics, or HPC or accelerated computing functionality as part of their solutions or platforms, such as Advanced Micro Devices, or AMD, Intel Corporation, or Intel, and Xilinx, Inc.; and
- suppliers of SOC products that are embedded into automobiles, autonomous machines, and gaming devices, such as Ambarella, Inc., AMD, Broadcom Inc., Intel, Qualcomm Incorporated, Renesas Electronics Corporation, Samsung, Texas Instruments Incorporated, and Xilinx Inc.

Patents and Proprietary Rights

We rely primarily on a combination of patents, trademarks, trade secrets, employee and third-party nondisclosure agreements, and licensing arrangements to protect our intellectual property in the United States and internationally. Our currently issued patents have expiration dates from February 2019 to February 2038. We have numerous patents issued, allowed, and pending in the United States and in foreign jurisdictions. Our patents and pending patent applications primarily relate to our products and the technology used in connection with our products. We also rely on international treaties, organizations, and foreign laws to protect our intellectual property. The laws of certain foreign countries in which our products are or may be manufactured or sold, including various countries in Asia, may not protect our products or intellectual property rights to the same extent as the laws of the United States. This decreased protection makes the possibility of piracy of our technology and products more likely. We continuously assess whether and where to seek formal protection for particular innovations and technologies based on such factors as:

- the location in which our products are manufactured;
- our strategic technology or product directions in different countries;
- the degree to which intellectual property laws exist and are meaningfully enforced in different jurisdictions; and
- the commercial significance of our operations and our competitors' operations in particular countries and regions.

We have also licensed technology from third parties for incorporation in some of our products and for defensive reasons, and expect to continue to enter into such license agreements.

Employees

As of January 27, 2019, we had 13,277 employees, 9,486 of whom were engaged in research and development and 3,791 of whom were engaged in sales, marketing, operations, and administrative positions.

Environmental Regulatory Compliance

To date, we have not incurred significant expenses related to environmental regulatory compliance matters.

Executive Officers of the Registrant

The following sets forth certain information regarding our executive officers, their ages and positions as of February 15, 2019:

Name	Age	Position
Jen-Hsun Huang	55	President and Chief Executive Officer
Colette M. Kress	51	Executive Vice President and Chief Financial Officer
Ajay K. Puri	64	Executive Vice President, Worldwide Field Operations
Debora Shoquist	64	Executive Vice President, Operations
Timothy S. Teter	52	Executive Vice President and General Counsel

Jen-Hsun Huang co-founded NVIDIA in 1993 and has served as our President, Chief Executive Officer and a member of the Board of Directors since our inception. From 1985 to 1993, Mr. Huang was employed at LSI Logic Corporation, a computer chip manufacturer, where he held a variety of positions including as Director of Coreware, the business unit responsible for LSI's SOC. From 1983 to 1985, Mr. Huang was a microprocessor designer for Advanced Micro Devices, Inc., a semiconductor company. Mr. Huang holds a B.S.E.E. degree from Oregon State University and an M.S.E.E. degree from Stanford University.

Colette M. Kress joined NVIDIA in 2013 as Executive Vice President and Chief Financial Officer. Prior to NVIDIA, Ms. Kress most recently served as Senior Vice President and Chief Financial Officer of the Business Technology and Operations Finance organization at Cisco Systems, Inc., a networking equipment company, since 2010. At Cisco, Ms. Kress was responsible for financial strategy, planning, reporting and business development for all business segments, engineering and operations. From 1997 to 2010 Ms. Kress held a variety of positions at Microsoft Corporation, a software company, including, beginning in 2006, Chief Financial Officer of the Server and Tools division, where Ms. Kress was responsible for financial strategy, planning, reporting and business development for the division. Prior to joining Microsoft, Ms. Kress spent eight years at Texas Instruments Incorporated, a semiconductor company, where she held a variety of finance positions. Ms. Kress holds a B.S. degree in Finance from University of Arizona and an M.B.A. degree from Southern Methodist University.

Ajay K. Puri joined NVIDIA in 2005 as Senior Vice President, Worldwide Sales and became Executive Vice President, Worldwide Field Operations in 2009. Prior to NVIDIA, he held positions in sales, marketing, and general management over a 22-year career at Sun Microsystems, Inc., a computing systems company. Mr. Puri previously held marketing, management consulting, and product development positions at Hewlett-Packard Company, an information technology company, Booz Allen Hamilton Inc., a management and technology consulting company, and Texas Instruments Incorporated. Mr. Puri holds a B.S.E.E. degree from the University of Minnesota, an M.S.E.E. degree from the California Institute of Technology and an M.B.A. degree from Harvard Business School.

Debora Shoquist joined NVIDIA in 2007 as Senior Vice President of Operations and in 2009 became Executive Vice President of Operations. Her role has since expanded with responsibility added for Facilities in 2013, and for Information Technology in 2015. Prior to NVIDIA, Ms. Shoquist served from 2004 to 2007 as Executive Vice President of Operations at JDS Uniphase Corp., a provider of communications test and measurement solutions and optical products for the telecommunications industry. She served from 2002 to 2004 as Senior Vice President and General Manager of the Electro-Optics business at Coherent, Inc., a manufacturer of commercial and scientific laser equipment. Previously, she worked at Quantum Corp., a data protection company, as President of the Personal Computer Hard Disk Drive Division, and at Hewlett-Packard Corp. Ms. Shoquist holds a B.S. degree in Electrical Engineering from Kansas State University and a B.S. degree in Biology from Santa Clara University.

Timothy S. Teter joined NVIDIA in 2017 as Senior Vice President, General Counsel and Secretary and became Executive Vice President, General Counsel and Secretary in February 2018. Prior to NVIDIA, Mr. Teter spent more than two decades at the law firm of Cooley LLP. He was most recently a partner at Cooley, where he focused on litigating patent and technology related matters. Prior to attending law school, he worked as an engineer at Lockheed Missiles and Space Company. Mr. Teter holds a B.S. degree in Mechanical Engineering from the University of California at Davis and a J.D. degree from Stanford Law School.

Available Information

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and, if applicable, amendments to those reports filed or furnished pursuant to Section 13(a) of the Securities Exchange Act of 1934, as amended, are available free of charge on or through our web site, <http://www.nvidia.com>, as soon as reasonably practicable after we electronically file such material with, or furnish it to, the Securities and Exchange Commission, or the SEC. The SEC's website, <http://www.sec.gov>, contains reports, proxy and information statements, and other information regarding

issuers that file electronically with the SEC. Our web site and the information on it or connected to it are not a part of this Annual Report on Form 10-K.

ITEM 1A. RISK FACTORS

In evaluating NVIDIA and our business, the following factors should be considered in addition to the other information in this Annual Report on Form 10-K. Before you buy our common stock, you should know that making such an investment involves risks including, but not limited to, the risks described below. Any one of the following risks could harm our business, financial condition, results of operations or reputation, which could cause our stock price to decline, and you may lose all or a part of your investment. Additional risks, trends and uncertainties not presently known to us or that we currently believe are immaterial may also harm our business, financial condition, results of operations or reputation.

Risks Related to Our Business, Industry and Partners

If we fail to meet the evolving needs of our markets, or identify new products, services or technologies, our revenue and financial results may be adversely impacted.

We have created GPU-based visual and accelerated computing platforms that address four large markets: Gaming, Professional Visualization, Datacenter, and Automotive. These markets often experience rapid technological change, changes in customer requirements, new product introductions and enhancements, and evolving industry standards. Our success depends on our ability to identify these emerging industry changes and to develop new (or enhance our existing) products, services and technologies that meet the evolving needs of these markets. Such activities may require considerable technical, financial, compliance, sales and marketing investments. We currently devote significant resources to the development of technologies and business offerings in markets where we have a limited operating history, such as the automotive and datacenter markets, which presents additional risks to our business. We must also continue to develop the infrastructure needed to appropriately scale our business in these areas, including customer service and customer support. We also must meet customer safety and compliance standards, which are subject to change. Additionally, we continue to make considerable investments in research and development, which may not produce significant revenue for several years, if at all. If our investments are unsuccessful and we fail to develop new products, services and technologies, or if we focus on technologies that do not become widely adopted, our business, revenue, financial condition and results of operations could be adversely affected. We cannot assure you that our strategic direction will result in innovative products and technologies that provide value to our customers, partners and ultimately, our shareholders. If we fail to anticipate the changing needs of our target markets and emerging technology trends, or if we do not appropriately adapt that strategy as market conditions evolve, in a timely manner to exploit potential market opportunities, our business will be harmed.

Competition in our current and target markets could prevent us from growing our revenue.

Our target markets remain extremely competitive, and we expect competition to intensify as current competitors expand their product and/or service offerings, industry standards continue to evolve, customer needs change and new competitors enter these markets. Our competitors' products, services and technologies may be less costly, or may offer superior functionality or better features, than ours, which may result, among other things, in lower than expected selling prices for our products. In addition, some of our competitors operate and maintain their own fabrication facilities, have longer operating histories, larger customer bases, more comprehensive intellectual property, or IP, portfolios and patent protections, and greater financial, sales, marketing and distribution resources than we do. These competitors may be able to more effectively identify and capitalize upon opportunities in new markets and end user customer trends, quickly transition their products, including semiconductor products, to increasingly smaller line width geometries, and obtain sufficient foundry capacity and packaging materials, which could harm our business. If we are unable to successfully compete in our target markets, respond to changes in our target markets or introduce new offerings to meet the needs of this competitive environment, including in significant international markets such as China, demand for our products, services and technologies could decrease, which would cause our revenue to decline and cause our results of operations to suffer. In addition, the competitive landscape in our target markets has changed and may continue to evolve due to a trend toward consolidation, which could lead to fewer customers, partners, or suppliers, any of which could negatively affect our financial results.

System security and data protection breaches, as well as cyber-attacks, could disrupt our operations, reduce our expected revenue and increase our expenses, which could adversely affect our stock price and damage our reputation.

Security breaches, computer malware and cyber-attacks have become more prevalent and sophisticated in recent years. These threats are constantly evolving, making it increasingly difficult to successfully defend against them or implement adequate preventative measures. These attacks have occurred on our systems in the past and are expected to occur in the future. Experienced computer programmers, hackers and employees may penetrate our security controls and misappropriate or compromise our confidential information, or that of our employees or third parties. These attacks may

create system disruptions or cause shutdowns. These hackers may also develop and deploy viruses, worms and other malicious software programs that attack or otherwise exploit security vulnerabilities in our products, including consumer and automotive products, where we utilize over-the-air updates to improve functionality over time. For portions of our IT infrastructure, including business management and communication software products, we rely on products and services provided by third parties. These providers may also experience breaches and attacks to their products which may impact our systems. Data security breaches may also result from non-technical means, such as actions by an employee with access to our systems. To defend against security threats, both to our internal systems and those of our customers, we must continuously engineer more secure products and enhance security and reliability features, which may result in increased expenses.

Actual or perceived breaches of our security measures or the accidental loss, inadvertent disclosure or unapproved dissemination of proprietary information or sensitive or confidential data about us, our partners, our customers or third parties could expose us and the parties affected to a risk of loss or misuse of this information, resulting in litigation and potential liability, paying damages, regulatory inquiries or actions, damage to our brand and reputation or other harm to our business. Our efforts to prevent and overcome these challenges could increase our expenses and may not be successful. We may experience interruptions, delays, cessation of service and loss of existing or potential customers. Such disruptions could adversely impact our ability to fulfill orders and interrupt other critical functions. Delayed sales, lower margins or lost customers as a result of these disruptions could adversely affect our financial results, stock price and reputation.

If our products contain significant defects, we could incur significant expenses to remediate such defects, our reputation could be damaged, and we could lose market share.

Our products are complex and may contain defects or security vulnerabilities, or experience failures or unsatisfactory performance due to any number of issues in design, fabrication, packaging, materials and/or use within a system. These risks may increase as our products are introduced into new devices, markets, technologies and applications, including into the automotive market, or as new versions are released. Some errors in our products or services may only be discovered after a product or service has been shipped or used by customers or the end users of such product. Undiscovered vulnerabilities in our products or services could expose our customers or end users to hackers or other unscrupulous third parties who develop and deploy viruses, worms and other malicious software programs that could attack our products or services. Failure of our products to perform to specifications, or other product defects, could lead to substantial damage to the products we sell directly to customers, the end product in which our device has been integrated by OEMs, ODMs, AIBs and Tier 1 automotive suppliers, and to the user of such end product. Any such defect may cause us to incur significant warranty, support and repair or replacement costs, write off the value of related inventory, cause us to lose market share, and divert the attention of our engineering personnel from our product development efforts to find and correct the issue. In addition, an error or defect in new products or releases or related software drivers after commencement of commercial shipments could result in failure to achieve market acceptance or loss of design wins, harm our relationships with customers and partners and harm consumers' perceptions of our brand. Also, we may be required to reimburse our customers, partners or consumers, including costs to repair or replace products in the field. A product recall, including automotive recalls or a recall due to a bug in our products, or a significant number of product returns could be expensive, damage our reputation, harm our ability to attract new customers, result in the shifting of business to our competitors and result in litigation against us, such as product liability suits. If a product liability claim is brought against us, the cost of defending the claim could be significant and would divert the efforts of our technical and management personnel, and harm our business. Further, our business liability insurance may be inadequate or future coverage may be unavailable on acceptable terms, which could adversely impact our financial results.

We depend on third parties and their technology to manufacture, assemble, test and/or package our products, which reduces our control over product quantity and quality, manufacturing yields, development, enhancement and product delivery schedule and could harm our business.

We do not manufacture the silicon wafers used for our GPUs and Tegra processors and do not own or operate a wafer fabrication facility. Instead, we are dependent on industry-leading foundries, such as Taiwan Semiconductor Manufacturing Company Limited and Samsung Electronics Co. Ltd., to manufacture our semiconductor wafers using their fabrication equipment and techniques. Similarly, we do not directly assemble, test or package our products, but instead rely on independent subcontractors. We do not have long-term commitment contracts with these foundries or subcontractors. As a result, we face several significant risks which could have an adverse effect on our ability to meet customer demand and/or negatively impact our business operations, gross margin, revenue and/or financial results, including:

- a lack of guaranteed supply of wafers and other components and potential higher wafer and component prices due to supply constraints;
- a failure by our foundries to procure raw materials or to provide or allocate adequate or any manufacturing or test capacity for our products;

- a failure to develop, obtain or successfully implement high quality, leading-edge process technologies, including transitions to smaller geometry process technologies such as advanced process node technologies and memory designs needed to manufacture our products profitably or on a timely basis;
- loss of a supplier and additional expense and/or production delays as a result of qualifying a new foundry or subcontractor and commencing volume production or testing in the event of a loss of or a decision to add or change a supplier;
- a lack of direct control over delivery schedules or product quantity and quality; and
- delays in product shipments, shortages, a decrease in product quality and/or higher expenses in the event our subcontractors or foundries prioritize our competitors' orders over our orders or otherwise.

In addition, low manufacturing yields could have an adverse effect on our ability to meet customer demand, increase manufacturing costs, harm customer or partner relationships, and/or negatively impact our business operations, gross margin, revenue and/or financial results. Manufacturing yields for our products are a function of product design, which is developed largely by us, and process technology, which typically is proprietary to the foundry. Low yields may result from either product design or process technology failure. We do not know whether a yield problem will exist until our design is actually manufactured by the foundry. As a result, yield problems may not be identified until well into the manufacturing process and require us and the foundry to cooperate to resolve the problem.

We also rely on third-party software development tools to assist us in the design, simulation and verification of new products or product enhancements, and to bring such new products and enhancements to market in a timely manner. In the past, we have experienced delays in the introduction of products and enhancements as a result of the inability of then available software development tools to fully simulate the complex features and functionalities of our products. The design requirements necessary to meet consumer demands for more features and greater functionality from our products may exceed the capabilities of available software development tools. If we miss design cycles or lose design wins due to the unavailability of such software development tools, we could lose market share and our revenues could decline. If we fail to achieve design wins for our products, our business will be harmed.

For our products that we do not sell directly to consumers, achieving design wins is an important success factor. Achieving design wins may involve a lengthy process in pursuit of a customer opportunity and depend on our ability to anticipate features and functionality that customers and consumers will demand. Failure to obtain a particular design win may prevent us from obtaining design wins in subsequent generations of a particular product. This could result in lost revenue and could weaken our position in future competitive bid selection processes.

Unanticipated changes in industry standards could render our products incompatible with products developed by major hardware manufacturers and software developers. Further, if our products are not in compliance with prevailing industry standards, including safety standards, our customers may not incorporate our products into their design strategies. Winning a product design does not guarantee sales to a customer or that we will realize as much revenue as anticipated, if any.

Business disruptions could harm our business, lead to a decline in revenues and increase our costs.

Our worldwide operations could be disrupted by earthquakes, telecommunications failures, power or water shortages, outages at cloud service providers, tsunamis, floods, hurricanes, typhoons, fires, extreme weather conditions, cyber-attacks, terrorist attacks, medical epidemics or pandemics and other natural or man-made disasters, catastrophic events or climate change. The occurrence of any of these disruptions could harm our business and result in significant losses, a decline in revenue and an increase in our costs and expenses. Any of these business disruptions could require substantial expenditures and recovery time in order to fully resume operations. Our corporate headquarters, and a portion of our research and development activities, are located in California, and other critical business operations, finished goods inventory, and some of our suppliers are located in Asia, near major earthquake faults known for seismic activity. In addition, a large portion of our current datacenter capacity is located in California, making our operations vulnerable to natural disasters or other business disruptions occurring in these geographical areas. The manufacture of product components, the final assembly of our products and other critical operations are concentrated in certain geographic locations, including Taiwan, China, and Korea. Geopolitical change or changes in government regulations and policies in the United States or abroad also may result in changing regulatory requirements, trade policies, import duties and economic disruptions that could impact our operating strategies, product demand, access to global markets, hiring, and profitability. In particular, revisions to laws or regulations or their interpretation and enforcement could result in increased taxation, trade sanctions, the imposition of import duties or tariffs, restrictions and controls on imports or exports, or other retaliatory actions, which could have an adverse effect on our business plans. For example, regulations to implement the Export Control Reform Act of 2018 could have an adverse effect on our business plans. Catastrophic events can also have an impact on third-party vendors who provide us critical infrastructure services for IT and research and development systems and personnel. Our operations

could be harmed if manufacturing, logistics or other operations in these locations are disrupted for any reason, including natural disasters, high heat events or water shortages, information technology system failures, military actions or economic, business, labor, environmental, public health, regulatory or political issues. The ultimate impact on us, our third-party foundries and other suppliers and our general infrastructure of being located near major earthquake faults and being consolidated in certain geographical areas is unknown. In the event a major earthquake or other disaster or catastrophic event affects us or the third-party systems on which we rely, our business could be harmed as a result of declines in revenue, increases in expenses, substantial expenditures and time spent to fully resume operations.

If we fail to estimate customer demand properly, our financial results could be harmed.

We manufacture our GPUs and Tegra processors based on estimates of customer demand and requirements. We sell many of our products through a channel model, and our channel customers sell to retailers, distributors, and/or end customers. As a result, the decisions made by our channel partners, retailers, and distributors in response to changing market conditions and the changing demand for our products could impact our financial results. In order to have shorter shipment lead times and quicker delivery schedules for our customers, we may build inventories for anticipated periods of growth which do not occur, may build inventory anticipating demand that does not materialize, or may build inventory to serve what we believe is pent-up demand. Such decisions may and have resulted in prolonged channel sell-through, as we experienced with our mid-range gaming GPUs in fiscal year 2019. In estimating demand, we make multiple assumptions, any of which may prove to be incorrect. Situations that may result in excess or obsolete inventory include:

- changes in business and economic conditions, including downturns in our target markets and/or overall economy;
- changes in consumer confidence caused by changes in market conditions, including changes in the credit market;
- a sudden and significant decrease in demand for our products;
- a higher incidence of inventory obsolescence because of rapidly changing technology or customer requirements;
- our introduction of new products resulting in lower demand for older products;
- less demand than expected for newly-introduced products; or
- increased competition, including competitive pricing actions.

The cancellation or deferral of customer purchase orders could result in our holding excess inventory, which could adversely affect our gross margins. In addition, because we often sell a substantial portion of our products in the last month of each quarter, we may not be able to reduce our inventory purchase commitments in a timely manner in response to customer cancellations or deferrals. We could be required to write-down our inventory to the lower of cost or market or write-off excess inventory, and we could experience a reduction in average selling prices if we incorrectly forecast product demand, any of which could harm our financial results.

Conversely, if we underestimate our customers' demand for our products, our foundry partners may not have adequate lead-time or capacity to increase production and we may not be able to obtain sufficient inventory to fill customers' orders on a timely basis. We may also face supply constraints caused by natural disasters or other events. In such cases, even if we are able to increase production levels to meet customer demand, we may not be able to do so in a cost-effective or timely manner. If we fail to fulfill our customers' orders on a timely basis, or at all, our customer relationships could be damaged, we could lose revenue and market share and our reputation could be damaged.

We are subject to risks and uncertainties associated with international operations, which may harm our business.

We conduct our business worldwide and we have offices in various countries outside of the United States. Our semiconductor wafers are manufactured, assembled, tested and packaged by third parties located outside of the United States. We also generate a significant portion of our revenue from sales outside the United States. We allocate revenue to individual countries based on the location to which the products are initially billed even if our customers' revenue is attributable to end customers that are located in a different location. Revenue from sales outside of the United States accounted for 87% of total revenue for each of fiscal years 2019, 2018, and 2017. Revenue from billings to China, including Hong Kong, was 24% of our revenue for fiscal year 2019, even if our customers' revenue is attributable to end customers that are located in a different location. Additionally, as of January 27, 2019, approximately 46% of our employees were located outside of the United States. The global nature of our business subjects us to a number of risks and uncertainties, which could have a material adverse effect on our business, financial condition and results of operations, including:

- international economic and political conditions, including as a result of the United Kingdom's vote to withdraw from the European Union, and other political tensions between countries in which we do business;
- unexpected changes in, or impositions of, legislative or regulatory requirements, including changes in tax laws;
- differing legal standards with respect to protection of intellectual property and employment practices;

- local business and cultural factors that differ from our normal standards and practices, including business practices that we are prohibited from engaging in by the Foreign Corrupt Practices Act and other anticorruption laws and regulations;
- exporting or importing issues related to export or import restrictions, including deemed export restrictions, tariffs, quotas and other trade barriers and restrictions;
- disruptions of capital and trading markets and currency fluctuations; and
- increased costs due to imposition of climate change regulations, such as carbon taxes, fuel or energy taxes, and pollution limits.

If our sales outside of the United States are delayed or cancelled because of any of the above factors, our revenue may be negatively impacted.

If we are unable to attract, retain and motivate our executives and key employees, we may not be able to execute our business strategy effectively.

To be competitive and execute our business strategy successfully, we must attract, retain and motivate our executives and key employees. The market for highly skilled workers and leaders in our industry is extremely competitive. In particular, hiring qualified executives, scientists, engineers, technical staff and research and development personnel is critical to our business. Additionally, changes in immigration and work permit laws and regulations or the administration or interpretation of such laws or regulations could impair our ability to attract and retain highly qualified employees. If we are less successful in our recruiting efforts, or if we cannot retain key employees, our ability to develop and deliver successful products and services may be adversely affected. Additionally, competition for personnel results in increased costs in the form of cash and stock-based compensation. The interpretation and application of employment related laws to our workforce practices may result in increased operating costs and less flexibility in how we meet our workforce needs. Effective succession planning is also important to our long-term success. Failure to ensure effective transfer of knowledge and smooth transitions involving key employees could hinder our strategic planning and execution.

We may not be able to realize the potential financial or strategic benefits of business acquisitions or strategic investments and we may not be able to successfully integrate acquisition targets, which could hurt our ability to grow our business, develop new products or sell our products.

We have in the past acquired and invested in, and may continue to acquire and invest in, other businesses that offer products, services and technologies that we believe will help expand or enhance our existing products, strategic objectives and business. The risks associated with past or future acquisitions or investments could impair our ability to grow our business, develop new products or sell our products, and ultimately could have a negative impact on our growth or our financial results. Given that our resources are limited, our decision to pursue a transaction has opportunity costs; accordingly, if we pursue a particular transaction, we may need to forgo the prospect of entering into other transactions that could help us achieve our strategic objectives. Additional risks related to acquisitions or strategic investments include, but are not limited to:

- difficulty in combining the technology, products, operations or workforce of the acquired business with our business;
- diversion of capital and other resources, including management's attention;
- assumption of liabilities and incurring amortization expenses, impairment charges to goodwill or write-downs of acquired assets;
- difficulty in realizing a satisfactory return, if at all;
- difficulty in obtaining regulatory, other approvals or financing;
- failure and costs associated with the failure to consummate a proposed acquisition or other strategic investment;
- legal proceedings initiated as a result of an acquisition or investment;
- uncertainties and time needed to realize the benefits of an acquisition or strategic investment, if at all;
- the need to later divest acquired assets if an acquisition does not meet our expectations;
- potential failure of our due diligence processes to identify significant issues with the acquired assets or company; and
- impairment of relationships with, or loss of our or our target's, employees, vendors and customers, as a result of our acquisition or investment.

Risks Related to Regulatory, Legal, Our Common Stock and Other Matters

Actions to adequately protect our IP rights could result in substantial costs to us and our ability to compete could be harmed if we are unsuccessful in doing so or if we are prohibited from making or selling our products.

We have in the past, currently are, and may in the future become involved in lawsuits or other legal proceedings alleging patent infringement or other intellectual property rights violations by us, our employees or parties that we have agreed to indemnify for certain claims of infringement. An unfavorable ruling in any such intellectual property related litigation could include significant damages, invalidation of a patent or family of patents, indemnification of customers, payment of lost profits, or, when it has been sought, injunctive relief. Claims that our products or processes infringe the IP rights of others, regardless of their merit, could cause us to incur significant costs to respond to, defend, and resolve such claims, and they may also divert the efforts and attention of management and technical personnel.

We may commence litigation or other legal proceedings in order to protect our intellectual property rights. Such proceedings may increase our operating expenses, which could negatively impact our operating results. Further, we could be subject to countersuits as a result of our initiation of litigation. If infringement claims are made against us or our products are found to infringe a third party's patent or intellectual property, we or one of our indemnitees may have to seek a license to the third party's patent or other intellectual property rights. However, we may not be able to obtain licenses at all or on terms acceptable to us particularly from our competitors. If we or one of our indemnitees is unable to obtain a license from a third party for technology that we use or that is used in one of our products, we could be subject to substantial liabilities or have to suspend or discontinue the manufacture and sale of one or more of our products. We may also have to make royalty or other payments, or cross license our technology. If these arrangements are not concluded on commercially reasonable terms, our business could be negatively impacted. Furthermore, the indemnification of a customer or other indemnitee may increase our operating expenses which could negatively impact our operating results.

Our success depends in part on protecting our intellectual property. To accomplish this, we rely primarily on a combination of patents, trademarks, trade secrets, employee and third-party nondisclosure agreements, licensing arrangements, and the laws of the countries in which we operate to protect our intellectual property in the United States and internationally. We may be required to spend significant resources to monitor and protect our intellectual property rights, and even with significant expenditures we may not be able to protect our intellectual property rights that are valuable to our business. The laws of certain foreign countries may not protect our products or intellectual property rights to the same extent as the laws of the United States. This makes the possibility of piracy of our technology and products more likely. In addition, the theft or unauthorized use or publication of our trade secrets and other confidential business information could harm our competitive position and reduce acceptance of our products; as a result, the value of our investment in research and development, product development, and marketing could be reduced. We continuously assess whether and where to seek formal protection for existing and new innovations and technologies, but cannot be certain whether our applications for such protections will be approved, and, if approved, whether we will be able to enforce such protections.

Our operating results have in the past fluctuated and may in the future fluctuate, and if our operating results are below the expectations of securities analysts or investors, our stock price could decline.

Our operating results have in the past fluctuated and may in the future continue to fluctuate due to numerous factors. Therefore, investors should not rely on quarterly comparisons of our results of operations as an indication of our future performance.

Factors, other than those described elsewhere in these risk factors, that could affect our results of operations in the future include, but are not limited to:

- our ability to achieve volume production of our next-generation products;
- our inability to adjust spending to offset revenue shortfalls due to the multi-year development cycle for some of our products and services;
- fluctuations in the demand for our products related to cryptocurrencies;
- changes in the timing of product orders due to unexpected delays in the introduction of our partners' products;
- our ability to cover the manufacturing and design costs of our products through competitive pricing;
- our ability to comply and continue to comply with our customers' contractual obligations;
- product rates of return in excess of that forecasted or expected due to quality issues;
- our ability to secure appropriate safety certifications and meet industry safety standards;
- supply constraints for and changes in the cost of the other components incorporated into our products
- inventory write-downs;

- our ability to continue generating revenue from our partner network, including by generating sales within our partner network and ensuring our products are incorporated into our partners product ecosystems, and our partner network's ability to sell products that incorporate our GPUs and Tegra processors;
- the inability of certain of our customers to make required payments to us, and our ability to obtain credit insurance over the purchasing credit extended to these customers;
- customer bad debt write-offs;
- any unanticipated costs associated with environmental liabilities;
- unexpected costs related to our ownership of real property;
- changes in financial accounting standards or interpretations of existing standards; and
- general macroeconomic or industry events and factors affecting the overall market and our target markets.

Any one or more of the factors discussed above could prevent us from achieving our expected future financial results. Any such failure to meet our expectations or the expectations of our investors or security analysts could cause our stock price to decline or experience substantial price volatility.

Privacy concerns relating to our products and services could damage our reputation, deter current and potential users from using our products and services, result in liability, or result in legal or regulatory proceedings.

Our products and services may provide us with access to sensitive, confidential or personal data or information that is subject to privacy and security laws and regulations. Concerns about our practices with regard to the collection, use, retention, security or disclosure of personal information or other privacy-related matters, even if unfounded, could damage our reputation and adversely affect our operating results. The theft, loss, or misuse of personal data collected, used, stored, or transferred by us to run our business or by one of our partners could result in significantly increased security costs, damage to our reputation, regulatory proceedings, disruption of our business activities or increased costs related to defending legal claims.

Worldwide regulatory authorities are considering and have approved various legislative proposals concerning data protection, which continue to evolve and apply to our business. For example, the European Union adopted the General Data Protection Regulation, or GDPR, which requires companies to meet new requirements beginning in May 2018 regarding the handling of personal data, including its use, protection and the ability of persons whose data is stored to correct or delete such data about themselves. Failure to meet GDPR requirements could result in penalties of up to 4% of worldwide revenue. In addition, the interpretation and application of consumer and data protection laws in the United States, Europe and elsewhere are often uncertain and fluid, and may be interpreted and applied in a manner that is inconsistent with our data practices. If so, we may be ordered to change our data practices and/or be fined. Complying with these changing laws has caused, and could continue to cause, us to incur substantial costs, which could have an adverse effect on our business and results of operations. Further, failure to comply with existing or new rules may result in significant penalties or orders to stop the alleged noncompliant activity.

We may have exposure to additional tax liabilities and our operating results may be adversely impacted by higher than expected tax rates.

As a multinational corporation, we are subject to income taxes as well as non-income based taxes, such as payroll, sales, use, value-added, net worth, property and goods and services taxes, in both the United States and various foreign jurisdictions. Our domestic and international tax liabilities are subject to the allocation of revenue and expenses in different jurisdictions. Significant judgment is required in determining our worldwide provision for income taxes and other tax liabilities. Further, changes in United States federal, and state or international tax laws applicable to multinational corporations or other fundamental law changes may materially impact our tax expense and cash flows, as we experienced in fiscal year 2018 with the passage of the Tax Cuts and Jobs Act, or TCJA.

Our future effective tax rate may be affected by such factors as changes in tax laws, changes in our business or statutory rates, changes in jurisdictions in which our profits are determined to be earned and taxed, changes in available tax credits, the resolution of issues arising from tax audits, changes in United States generally accepted accounting principles, adjustments to income taxes upon finalization of tax returns, increases in expenses not deductible for tax purposes, changes in the valuation of our deferred tax assets and liabilities and in deferred tax valuation allowances, changing interpretation of existing laws or regulations, the impact of accounting for stock-based compensation and the recognition of excess tax benefits and tax deficiencies within the income tax provision in the period in which they occur, the impact of accounting for business combinations, shifts in the amount of earnings in the United States compared with other regions in the world and overall levels of income before tax, changes in our international organization, as well as the expiration of statute of limitations and settlements of audits. Any changes in our effective tax rate may reduce our net income.

Our business is exposed to the risks associated with litigation, investigations and regulatory proceedings.

We currently and may in the future face legal, administrative and regulatory proceedings, claims, demands and/or investigations involving shareholder, consumer, competition and/or other issues relating to our business on a global basis. For example, multiple securities litigation claims have recently been filed against us and certain of our officers based on the dissemination of allegedly false and misleading statements related to channel inventory and the impact of cryptocurrency mining on GPU demand. In addition, a stockholder, purporting to act on behalf of the Company, filed a derivative lawsuit seeking to assert claims on behalf of the Company against the members of our board of directors and certain officers based on the dissemination of allegedly false and misleading statements related to channel inventory and the impact of cryptocurrency mining on GPU demand.

Litigation and regulatory proceedings are inherently uncertain, and adverse rulings could occur, including monetary damages, or an injunction stopping us from manufacturing or selling certain products, engaging in certain business practices, or requiring other remedies, such as compulsory licensing of patents. An unfavorable outcome or settlement may result in a material adverse impact on our business, results of operations, financial position, and overall trends. In addition, regardless of the outcome, litigation can be costly, time-consuming, and disruptive to our operations.

In addition, the laws and regulations our business is subject to are complex, and change frequently. We may be required to incur significant expense to comply with, or remedy violations of, these regulations.

Delaware law and provisions in our certificate of incorporation, our bylaws and our agreement with Microsoft Corporation could delay or prevent a change in control.

Our status as a Delaware corporation and the anti-takeover provisions of the Delaware General Corporation Law may discourage, delay, or prevent a change in control by prohibiting us from engaging in a business combination with an interested shareholder for a period of three years after the person becomes an interested shareholder, even if a change of control would be beneficial to our existing shareholders. In addition, our certificate of incorporation and bylaws contain provisions that could make it more difficult for a third party to acquire a majority of our outstanding voting stock. These provisions include the following:

- the ability of our Board of Directors to create and issue preferred stock without prior shareholder approval;
- the prohibition of shareholder action by written consent;
- advance notice requirements for director nominations and shareholder proposals;
- the ability of our Board of Directors to increase or decrease the number of directors without shareholder approval;
- a super-majority voting requirement to amend some provisions in our certificate of incorporation and bylaws;
- the inability of our shareholders to call special meetings of shareholders; and
- the ability of our Board of Directors to make, amend or repeal our bylaws.

On March 5, 2000, we entered into an agreement with Microsoft in which we agreed to develop and sell graphics chips and to license certain technology to Microsoft and its licensees for use in the Xbox. Under the agreement, if an individual or corporation makes an offer to purchase shares equal to or greater than 30% of the outstanding shares of our common stock, Microsoft may have first and last rights of refusal to purchase the stock. The Microsoft provision and the other factors listed above could also delay or prevent a change in control of NVIDIA. These provisions could also discourage proxy contests and make it more difficult for shareholders to elect directors of their choosing and to cause us to take other corporate actions they desire.

ITEM 1B. UNRESOLVED STAFF COMMENTS

Not applicable.

ITEM 2. PROPERTIES

Our headquarters complex is located in Santa Clara, California. It includes ten leased commercial buildings totaling 981,389 square feet, and real property that we own totaling 1,257,346 square feet. Our owned property consists of two commercial buildings on 36 acres of land. In addition, we also lease datacenter space in Santa Clara, California.

Outside of Santa Clara, California, we lease facilities in Austin, Texas and a number of regional facilities in other U.S. locations that are used as research and development centers and/or sales and administrative offices. Outside of the United States, we own a building in Hyderabad, India, that is being used primarily as a research and development center. We also lease facilities in various international locations that are used as research and development centers and/or sales and

administrative offices. These leased facilities are located primarily in Asia and Europe. In addition, we also lease datacenter space in various locations around the world.

We believe that we currently have sufficient facilities to conduct our operations for the next twelve months. For additional information regarding obligations under leases, refer to Note 12 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K under the subheading "Lease Obligations," which information is hereby incorporated by reference.

ITEM 3. LEGAL PROCEEDINGS

Please see Note 12 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for a discussion of our legal proceedings.

ITEM 4. MINE SAFETY DISCLOSURES

Not Applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Our common stock is traded on the Nasdaq Global Select Market under the symbol NVDA. Public trading of our common stock began on January 22, 1999. Prior to that, there was no public market for our common stock. As of February 15, 2019, we had approximately 317 registered shareholders, not including those shares held in street or nominee name.

Issuer Purchases of Equity Securities

Beginning August 2004, our Board of Directors authorized us to repurchase our stock.

Since the inception of our share repurchase program, we have repurchased an aggregate of 260 million shares for a total cost of \$7.08 billion through January 27, 2019. All shares delivered from these repurchases have been placed into treasury stock.

In November 2018, the Board authorized an additional \$7.00 billion under our share repurchase program and extended it through the end of December 2022. As of January 27, 2019, we were authorized to repurchase additional shares of our common stock up to \$7.24 billion.

We intend to return \$3.00 billion to shareholders by the end of fiscal year 2020, including \$700 million of share repurchases we made in the fourth quarter of fiscal year 2019.

The repurchases can be made in the open market, in privately negotiated transactions, or in structured share repurchase programs, and can be made in one or more larger repurchases, in compliance with Rule 10b-18 of the Securities Exchange Act of 1934, as amended, subject to market conditions, applicable legal requirements, and other factors. The program does not obligate NVIDIA to acquire any particular amount of common stock and the program may be suspended at any time at our discretion.

The following table presents details of our share repurchase transactions during the fourth quarter of fiscal year 2019:

Period	Total Number of Shares Purchased (In thousands)	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Program (In thousands)	Approximate Dollar Value of Shares that May Yet Be Purchased Under the Program (In billions)
October 29, 2018 - November 25, 2018	123	\$ 195.72	123	\$ 7.94
November 26, 2018 - December 23, 2018	3,304	\$ 142.05	3,304	\$ 7.47
December 24, 2018 - January 27, 2019	1,777	\$ 129.87	1,777	\$ 7.24
Total	<u>5,204</u>		<u>5,204</u>	

Transactions Related to our 1.00% Convertible Senior Notes Due 2018 and Note Hedges

During fiscal year 2019, we issued an aggregate of 714 thousand shares of our common stock upon settlement of \$16 million in principal amount of 1.00% Convertible Senior Notes Due 2018, or the Convertible Notes, submitted for conversion. In connection with these conversions, we exercised a portion of our Note Hedges to acquire an equal number of shares of our common stock. The counterparty to the Note Hedges may be deemed an “affiliated purchaser” and may have purchased the shares of our common stock deliverable to us upon this exercise of our option. Refer to Note 11 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for further discussion regarding the Convertible Notes and the Note Hedges.

Restricted Stock Unit Share Withholding

We also withhold common stock shares associated with net share settlements to cover tax withholding obligations upon the vesting of restricted stock unit awards under our employee equity incentive program. During fiscal year 2019, we withheld approximately 4 million shares at a total cost of \$1.03 billion through net share settlements. Refer to Note 3 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for further discussion regarding our equity incentive plans.

Stock Performance Graphs

The following graph compares the cumulative total shareholder return for our common stock, the S&P 500 Index, and the Nasdaq 100 Index for the five years ended January 27, 2019. The graph assumes that \$100 was invested on January 26, 2014 in our common stock and in each of the S&P 500 Index and the Nasdaq 100 Index. Our common stock is a component of each of the presented indices. Total return assumes reinvestment of dividends in each of the indices indicated. Total return is based on historical results and is not intended to indicate future performance.



*\$100 invested on 1/26/14 in stock and in indices, including reinvestment of dividends.

The S&P 500 index is proprietary to and are calculated, distributed and marketed by S&P Opco, LLC (a subsidiary of S&P Dow Jones Indices LLC), its affiliates and/or its licensors and has been licensed for use. S&P® and S&P 500®, among other famous marks, are registered trademarks of Standard & Poor's Financial Services LLC, and Dow Jones® is a registered trademark of Dow Jones Trademark Holdings LLC. © 2016 S&P Dow Jones Indices LLC, its affiliates and/or its licensors. All rights reserved.

	1/26/2014	1/25/2015	1/31/2016	1/29/2017	1/28/2018	1/27/2019
NVIDIA Corporation	\$ 100.00	\$ 135.49	\$ 194.78	\$ 750.36	\$ 1,639.87	\$ 1,082.30
S&P 500	\$ 100.00	\$ 111.92	\$ 108.84	\$ 127.84	\$ 158.41	\$ 151.70
Nasdaq 100	\$ 100.00	\$ 119.26	\$ 124.52	\$ 150.83	\$ 207.18	\$ 208.13

ITEM 6. SELECTED FINANCIAL DATA

The following selected financial data should be read in conjunction with our financial statements and the notes thereto, and with Item 7, "Management's Discussion and Analysis of Financial Condition and Results of Operations." The Consolidated Statements of Income data for fiscal years 2019, 2018, and 2017 and the Consolidated Balance Sheets data as of January 27, 2019 and January 28, 2018 have been derived from and should be read in conjunction with our audited consolidated financial statements and the notes thereto included in Part IV, Item 15 in this Annual Report on Form 10-K. We operate on a 52- or 53-week year, ending on the last Sunday in January. Fiscal years 2019, 2018, 2017, and 2015 were 52-week years and fiscal year 2016 was a 53-week year.

	Year Ended				
	January 27, 2019	January 28, 2018	January 29, 2017	January 31, 2016 (A)	January 25, 2015
<i>(In millions, except per share data)</i>					
Consolidated Statements of Income Data:					
Revenue	\$ 11,716	\$ 9,714	\$ 6,910	\$ 5,010	\$ 4,682
Income from operations	\$ 3,804	\$ 3,210	\$ 1,934	\$ 747	\$ 759
Net income	\$ 4,141	\$ 3,047	\$ 1,666	\$ 614	\$ 631
Net income per share:					
Basic	\$ 6.81	\$ 5.09	\$ 3.08	\$ 1.13	\$ 1.14
Diluted	\$ 6.63	\$ 4.82	\$ 2.57	\$ 1.08	\$ 1.12
Weighted average shares used in per share computation:					
Basic	608	599	541	543	552
Diluted	625	632	649	569	563

	Year Ended				
	January 27, 2019 (B,C)	January 28, 2018 (B,C)	January 29, 2017 (B,C)	January 31, 2016 (B)	January 25, 2015
<i>(In millions, except per share data)</i>					
Consolidated Balance Sheets Data:					
Cash, cash equivalents and marketable securities.....	\$ 7,422	\$ 7,108	\$ 6,798	\$ 5,037	\$ 4,623
Total assets	\$ 13,292	\$ 11,241	\$ 9,841	\$ 7,370	\$ 7,201
Debt obligations	\$ 1,988	\$ 2,000	\$ 2,779	\$ 1,413	\$ 1,384
Convertible debt conversion obligation	\$ —	\$ —	\$ 31	\$ 87	\$ —
Total shareholders' equity	\$ 9,342	\$ 7,471	\$ 5,762	\$ 4,469	\$ 4,418
Cash dividends declared and paid per common share (D)	\$ 0.610	\$ 0.570	\$ 0.485	\$ 0.395	\$ 0.340

- (A) In fiscal year 2016, we began the wind down of our Icera modem operations. As a result, our income from operations for fiscal year 2016 included \$131 million of restructuring and other charges.
- (B) In fiscal year 2014, we issued Convertible Notes in the aggregate principal amount of \$1.50 billion. The Convertible Notes first became convertible as of February 1, 2016 and matured on December 1, 2018. Refer to Note 11 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.
- (C) In fiscal year 2017, we issued \$1.00 billion of the Notes Due 2021, and \$1.00 billion of the Notes Due 2026. Interest on the Notes is payable on March 16 and September 16 of each year, beginning on March 16, 2017. Refer to Note 11 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.
- (D) In November 2012, we initiated a quarterly dividend payment of \$0.075 per share, or \$0.30 per share on an annual basis. In May 2015, we increased the quarterly cash dividend to \$0.0975 per share, or \$0.39 per share on an annual basis. In November 2015, we increased the quarterly cash dividend to \$0.115 per share, or \$0.46 per share on an annual basis. In November 2016, we increased the quarterly cash dividend to \$0.14 per share, or \$0.56 per share on an annual basis. In November 2017, we increased the quarterly cash dividend to \$0.15 per share, or \$0.60 per share on an annual basis. In November 2018, we increased the quarterly cash dividend to \$0.16 per share, or \$0.64 per share on an annual basis.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with "Item 1A. Risk Factors", "Item 6. Selected Financial Data", our Consolidated Financial Statements and related Notes thereto, as well as other cautionary statements and risks described elsewhere in this Annual Report on Form 10-K, before deciding to purchase, hold or sell shares of our common stock.

Overview

Our Company and Our Businesses

Starting with a focus on PC graphics, NVIDIA invented the GPU to solve some of the most complex problems in computer science. We have extended our focus in recent years to the revolutionary field of AI. Fueled by the sustained demand for better 3D graphics and the scale of the gaming market, NVIDIA has evolved the GPU into a computer brain at the intersection of VR, HPC, and AI.

Our two reportable segments - GPU and Tegra Processor - are based on a single underlying architecture. From our proprietary processors, we have created platforms that address four large markets where our expertise is critical: Gaming, Professional Visualization, Datacenter, and Automotive.

Our GPU product brands are aimed at specialized markets including GeForce for gamers; Quadro for designers; Tesla and DGX for AI data scientists and big data researchers; and GRID for cloud-based visual computing users. Our Tegra brand integrates an entire computer onto a single chip, and incorporates GPUs and multi-core CPUs to drive supercomputing for autonomous robots, drones, and cars, as well as for game consoles and mobile gaming and entertainment devices.

Headquartered in Santa Clara, California, NVIDIA was incorporated in California in April 1993 and reincorporated in Delaware in April 1998.

Recent Developments, Future Objectives and Challenges

Fiscal Year 2019 Summary

	Year Ended		
	January 27, 2019	January 28, 2018	Change
(\$ in millions, except per share data)			
Revenue	\$ 11,716	\$ 9,714	Up 21%
Gross margin	61.2%	59.9%	Up 130 bps
Operating expenses	\$ 3,367	\$ 2,612	Up 29%
Income from operations	\$ 3,804	\$ 3,210	Up 19%
Net income	\$ 4,141	\$ 3,047	Up 36%
Net income per diluted share	\$ 6.63	\$ 4.82	Up 38%

Revenue for fiscal year 2019 increased 21% year over year, reflecting growth in each of our market platforms - gaming, professional visualization, datacenter, and automotive. GPU business revenue was \$10.17 billion, up 25% from a year earlier. Tegra Processor business revenue - which includes automotive, SOC modules for gaming platforms, and embedded edge AI platforms - was \$1.54 billion, up slightly from a year ago.

Gaming revenue was \$6.25 billion, up 13% from a year ago driven by growth in gaming GPUs. Gaming GPU growth was fueled by Turing-based GPUs for desktops and by gaming notebooks based on our Max-Q technology. We experienced significant volatility in our Gaming revenue during fiscal year 2019. We believe demand for our desktop gaming GPU products used by end users for cryptocurrency mining and its after-effects have distorted trends in Gaming revenue. We also believe that deteriorating macroeconomic conditions, particularly in China have impacted consumer demand for our GeForce gaming GPU products. In addition, sales of certain high-end GeForce gaming GPUs using our new Turing architecture that we released during fiscal year 2019 were lower than we expected for the launch of a new architecture. As a result, during a portion of fiscal year 2019, we shipped a higher amount of desktop gaming GPU products relative to where end user demand turned out to be and subsequently compensated by shipping a lower amount of desktop gaming GPU products relative to end user demand to allow the channel to work down that inventory. For fiscal year 2020, we expect our Gaming revenue to be slightly down compared to fiscal year 2019, with expected growth from sales of Turing-based GPU products and notebook GPU products partially offsetting decreases that we believe were caused by the previously-noted factors.

Professional visualization revenue was \$1.13 billion, up 21% from a year earlier driven by strength across both desktop and mobile workstation products.

Datacenter revenue was \$2.93 billion, up 52% from a year ago, led by strong sales of our Volta architecture-based products, including NVIDIA Tesla V100 and DGX systems. Toward the end of fiscal year 2019, we believe that customers across broad-based vertical markets and geographies became increasingly cautious due to economic uncertainty, and a number of

Datacenter deals did not close. While we believe the pause is temporary, our visibility remains relatively low and we do not expect a meaningful recovery in the Datacenter market until later in fiscal year 2020.

Automotive revenue of \$641 million was up 15% from a year earlier, driven by infotainment modules, production DRIVE platforms, and development agreements with automotive companies.

OEM and IP revenue was \$767 million, down 1% from a year ago, driven by the absence of Intel licensing revenue, which concluded in the first quarter of fiscal year 2018. Revenue from cryptocurrency-specific products in fiscal years 2019 and 2018 was \$306 million and \$273 million, respectively. We expect revenue from cryptocurrency-specific products to be negligible going forward.

Gross margin for fiscal year 2019 was 61.2%, compared with 59.9% a year earlier, which reflects our continued shift toward higher-value platforms, which more than offset the impact of approximately \$128 million in charges for excess DRAM and other components we recorded in the fourth quarter of fiscal year 2019 and a charge of \$57 million we recorded during the third quarter of fiscal year 2019 related to prior architecture components and chips.

Operating expenses for fiscal year 2019 were \$3.37 billion, up 29% from a year earlier, reflecting primarily employee additions and increases in employee compensation and other related costs, including infrastructure costs.

Income from operations for fiscal year 2019 was \$3.80 billion, up 19% from a year earlier. Net income and net income per diluted share for fiscal year 2019 were \$4.14 billion and \$6.63, respectively, up 36% and 38%, respectively, from a year earlier, fueled primarily by revenue growth and improved gross margin, as well as the impact of the U.S. tax reform benefit.

During fiscal year 2019, we returned \$1.95 billion to shareholders through a combination of \$1.58 billion in share repurchases and \$371 million in quarterly cash dividends. We intend to return \$3.00 billion to shareholders by the end of fiscal year 2020, including \$700 million of share repurchases we made in the fourth quarter of fiscal year 2019.

Cash, cash equivalents and marketable securities were \$7.42 billion as of January 27, 2019, compared with \$7.11 billion as of January 28, 2018. The increase was primarily related to the increase in net income, partially offset by changes in working capital and the increases in stock repurchases, dividends and taxes paid related to restricted stock units.

GPU Business

During fiscal year 2019, for gaming, we announced NVIDIA RTX - a computer graphics technology using our Turing architecture that produces movie-quality images in real time using ray tracing and AI. During the year, we released many new GeForce RTX desktop gaming GPU products, including RTX 2080Ti, 2080, 2070 and 2060, as well as many new Max-Q GeForce gaming notebook GPU products - the most recent of which are powered by RTX GPUs.

For our professional visualization platform, we announced the Quadro GV100 GPU with RTX technology, making real-time ray tracing possible on professional design and content creation applications. We also unveiled the Quadro RTX series, which is designed to revolutionize the workflow of designers and artists on the desktop, and announced the NVIDIA CUDA-accelerated REDCODE RAW decode SDK, enabling developers and studios to edit 8K video.

For our datacenter platform, we unveiled many advances to our deep learning computing platform - including NVIDIA Tesla V100 GPUs with 32GB memory, NVIDIA NVSwitch GPU interconnect fabric, the NVIDIA DGX-2 and HGX-2 for AI and HPC, the NVIDIA RTX Server, and TensorRT 4 AI inference accelerator software. In addition, we introduced RAPIDS, an open-source GPU-acceleration platform for data science and machine learning, launched the NVIDIA T4 cloud GPU and NVIDIA TensorRT Hyperscale Inference Platform for advanced acceleration in hyperscale datacenters, announced GPU acceleration for Kubernetes to facilitate enterprise inference deployment on multi-cloud GPU clusters, and announced that five of the world's seven fastest supercomputers are powered by NVIDIA GPUs.

Tegra Processor Business

During fiscal year 2019, for the automotive market, we introduced the NVIDIA DRIVE AutoPilot Level 2+ automated driving system, announced NVIDIA DRIVE AGX design wins with Toyota, Volvo Cars and Isuzu Motors, and announced that Daimler and Bosch have selected NVIDIA's DRIVE platform to bring automated and driverless vehicles to city streets. We also began production of our Xavier single-chip autopilot SOC, started shipping the NVIDIA DRIVE AGX Xavier developer kit, and introduced the NVIDIA DRIVE Constellation server with DRIVE Sim software to safely test drive autonomous vehicles over billions of miles in virtual reality by leveraging NVIDIA GPUs and NVIDIA DRIVE Pegasus.

In addition, we launched the NVIDIA Jetson AGX Xavier module to help build the next-generation of autonomous machines and announced that Yamaha Motor Co. will use NVIDIA to power its upcoming lineup of autonomous machines.

Critical Accounting Policies and Estimates

Management's discussion and analysis of financial condition and results of operations are based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States, or U.S. GAAP. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenue, cost of revenue, expenses and related disclosure of contingencies. On an on-going basis, we evaluate our estimates, including those related to revenue recognition, inventories, income taxes, goodwill, cash equivalents and marketable securities, stock-based compensation, and litigation, investigation and settlement costs and other contingencies. We base our estimates on historical experience and on various other assumptions that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities.

We believe the following critical accounting policies affect our significant judgments and estimates used in the preparation of our consolidated financial statements. Our management has discussed the development and selection of these critical accounting policies and estimates with the Audit Committee of our Board of Directors. The Audit Committee has reviewed our disclosures relating to our critical accounting policies and estimates in this Annual Report on Form 10-K.

Revenue Recognition

We derive our revenue from product sales, including hardware and systems, license and development arrangements, and software licensing. We determine revenue recognition through the following steps: (1) identification of the contract with a customer; (2) identification of the performance obligations in the contract; (3) determination of the transaction price; (4) allocation of the transaction price to the performance obligations in the contract; and (5) recognition of revenue when, or as, we satisfy a performance obligation.

Product Sales Revenue

Revenue from product sales is recognized upon transfer of control of promised products to customers in an amount that reflects the consideration we expect to receive in exchange for those products. Revenue is recognized net of allowances for returns, customer programs and any taxes collected from customers.

For products sold with a right of return, we record a reduction to revenue by establishing a sales return allowance for estimated product returns at the time revenue is recognized, based primarily on historical return rates. However, if product returns for a fiscal period are anticipated to exceed historical return rates, we may determine that additional sales return allowances are required to properly reflect our estimated exposure for product returns.

Our customer programs involve rebates, which are designed to serve as sales incentives to resellers of our products in various target markets, and marketing development funds, or MDFs, which represent monies paid to our partners that are earmarked for market segment development and are designed to support our partners' activities while also promoting NVIDIA products. We account for customer programs as a reduction to revenue and accrue for potential rebates and MDFs based on the amount we expect to be claimed by customers.

License and Development Arrangements

Our license and development arrangements with customers typically require significant customization of our intellectual property components. As a result, we recognize the revenue from the license and the revenue from the development services as a single performance obligation over the period in which the development services are performed. We measure progress to completion based on actual cost incurred to date as a percentage of the estimated total cost required to complete each project. If a loss on an arrangement becomes probable during a period, we record a provision for such loss in that period.

Software Licensing

Our software licenses provide our customers with a right to use the software when it is made available to the customer. Customers may purchase either perpetual licenses or subscriptions to licenses, which differ mainly in the duration over which the customer benefits from the software. Software licenses are frequently sold along with post-contract customer support, or PCS. For such arrangements, we allocate revenue to the software license and PCS on a relative standalone selling price basis by maximizing the use of observable inputs to determine the standalone selling price for each performance obligation. Revenue from software licenses is recognized up front when the software is made available to the customer. PCS revenue is recognized ratably over the service period, or as services are performed.

Refer to Note 1 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

Inventories

Inventory cost is computed on an adjusted standard basis, which approximates actual cost on an average or first-in, first-out basis. We charge cost of sales for inventory provisions to write down our inventory to the lower of cost or net realizable value or to completely write off obsolete or excess inventory. Most of our inventory provisions relate to the write-off of excess quantities of products, based on our inventory levels and future product purchase commitments compared to assumptions about future demand and market conditions.

Situations that may result in excess or obsolete inventory include changes in business and economic conditions, changes in market conditions, sudden and significant decreases in demand for our products, inventory obsolescence because of changing technology and customer requirements, failure to estimate customer demand properly, or unexpected competitive pricing actions by our competition. In addition, cancellation or deferral of customer purchase orders could result in our holding excess inventory.

The overall net effect on our gross margin from inventory provisions and sales of items previously written down was an unfavorable impact of 2.0% in fiscal year 2019 and insignificant in fiscal years 2018 and 2017. The higher amount of charges we took to cost of sales for inventory provisions during fiscal year 2019 were primarily related to excess DRAM, other components, and prior architecture components and chips, whereas the charges we took during fiscal years 2018 and 2017 were primarily related to the write-off of excess quantities of GPU and Tegra products whose inventory levels were higher than our updated forecasts of future demand for those products. As a fabless semiconductor company, we must make commitments to purchase inventory based on forecasts of future customer demand. In doing so, we must account for our third-party manufacturers' lead times and constraints. We also adjust to other market factors, such as product offerings and pricing actions by our competitors, new product transitions, and macroeconomic conditions - all of which may impact demand for our products.

Refer to the Gross Profit and Gross Margin discussion below in this Management's Discussion and Analysis for further discussion.

Income Taxes

We recognize federal, state and foreign current tax liabilities or assets based on our estimate of taxes payable or refundable in the current fiscal year by tax jurisdiction. We recognize federal, state and foreign deferred tax assets or liabilities, as appropriate, for our estimate of future tax effects attributable to temporary differences and carryforwards; and we record a valuation allowance to reduce any deferred tax assets by the amount of any tax benefits that, based on available evidence and judgment, are not expected to be realized.

Our calculation of deferred tax assets and liabilities is based on certain estimates and judgments and involves dealing with uncertainties in the application of complex tax laws. Our estimates of deferred tax assets and liabilities may change based, in part, on added certainty or finality to an anticipated outcome, changes in accounting standards or tax laws in the United States, or foreign jurisdictions where we operate, or changes in other facts or circumstances. In addition, we recognize liabilities for potential United States and foreign income tax contingencies based on our estimate of whether, and the extent to which, additional taxes may be due. If we determine that payment of these amounts is unnecessary or if the recorded tax liability is less than our current assessment, we may be required to recognize an income tax benefit or additional income tax expense in our financial statements accordingly.

As of January 27, 2019, we had a valuation allowance of \$562 million related to state and certain foreign deferred tax assets that management determined are not likely to be realized due to projections of future taxable income and potential utilization limitations of tax attributes acquired as a result of stock ownership changes. To the extent realization of the deferred tax assets becomes more-likely-than-not, we would recognize such deferred tax asset as an income tax benefit during the period.

We recognize the benefit from a tax position only if it is more-likely-than-not that the position would be sustained upon audit based solely on the technical merits of the tax position. Our policy is to include interest and penalties related to unrecognized tax benefits as a component of income tax expense.

The TCJA, which was enacted in December 2017, significantly changed U.S. tax law, including a reduction of the U.S. federal corporate income tax rate from 35% to 21%, a requirement for companies to pay a one-time transition tax on the earnings of certain foreign subsidiaries that were previously tax deferred, and the creation of new taxes (global intangible low-taxed income, or GILTI) on certain foreign-source earnings. As a fiscal year-end taxpayer, certain provisions of the TCJA began to impact us in the fourth quarter of fiscal year 2018, while other provisions impacted us beginning in fiscal year 2019. The SEC had provided guidance in Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act (SAB 118), which allowed companies to record provisional amounts during a measurement period up to one year

from the enactment date. As of January 27, 2019, we completed our accounting for all of the enactment-date income tax effects of the TCJA and elected to account for GILTI in deferred taxes. Refer to Note 13 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information specific to accounting for income taxes and the impacts from the enactment of the TCJA.

Goodwill

Goodwill is subject to our annual impairment test during the fourth quarter of our fiscal year, or earlier, if indicators of potential impairment exist, using either a qualitative or a quantitative assessment. Our impairment review process compares the fair value of the reporting unit in which the goodwill resides to its carrying value. We have identified two reporting units, GPU and Tegra Processor, for the purposes of completing our goodwill analysis. Goodwill assigned to the GPU and Tegra Processor reporting units as of January 27, 2019 was \$210 million and \$408 million, respectively. Determining the fair value of a reporting unit requires us to make judgments and involves the use of significant estimates and assumptions. We also make judgments and assumptions in allocating assets and liabilities to each of our reporting units. We base our fair value estimates on assumptions we believe to be reasonable but that are unpredictable and inherently uncertain.

During the fourth quarter of fiscal year 2019, we used the qualitative assessment to test goodwill for impairment for each reporting unit and concluded there was no impairment.

Refer to Note 5 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

Cash Equivalents and Marketable Securities

Cash equivalents consist of financial instruments which are readily convertible into cash and have original maturities of three months or less at the time of acquisition. Marketable securities consist of highly liquid debt investments with maturities greater than three months when purchased. We measure our cash equivalents and marketable securities at fair value. The fair values of our financial assets are determined using quoted market prices of identical assets or quoted market prices of similar assets from active markets. All of our available-for-sale debt investments are subject to a periodic impairment review. We record a charge to earnings when a decline in fair value is significantly below cost basis and judged to be other-than-temporary, or have other indicators of impairments.

We performed an impairment review of our debt investment portfolio as of January 27, 2019. We concluded that our debt investments were appropriately valued and that no other-than-temporary impairment charges were necessary on our portfolio of available-for-sale debt investments as of January 27, 2019.

Refer to Notes 7 and 8 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

Stock-based Compensation

Our stock-based compensation expense is associated with restricted stock units, or RSUs, performance stock units that are based on our corporate financial performance targets, or PSUs, performance stock units that are based on market conditions, or market-based PSUs, and our employee stock purchase plan. The number of PSUs and market-based PSUs that will ultimately be awarded is contingent on the Company's level of achievement compared with the corporate financial performance target established by our Compensation Committee in the beginning of each fiscal year.

Refer to Notes 1 and 3 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

Litigation, Investigation and Settlement Costs

From time to time, we are involved in legal actions and/or investigations by regulatory bodies. We are aggressively defending our current litigation matters. However, there are many uncertainties associated with any litigation or investigations, and we cannot be certain that these actions or other third-party claims against us will be resolved without costly litigation, fines and/or substantial settlement payments. If that occurs, our business, financial condition and results of operations could be materially and adversely affected. If information becomes available that causes us to determine that a loss in any of our pending litigation, investigations or settlements is probable, and we can reasonably estimate the loss associated with such events, we will record the loss in accordance with U.S. GAAP. However, the actual liability in any such litigation or investigation may be materially different from our estimates, which could require us to record additional costs.

Results of Operations

The following table sets forth, for the periods indicated, certain items in our Consolidated Statements of Income expressed as a percentage of revenue.

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
Revenue	100.0%	100.0%	100.0%
Cost of revenue	38.8	40.1	41.2
Gross profit	61.2	59.9	58.8
Operating expenses:			
Research and development	20.3	18.5	21.2
Sales, general and administrative	8.5	8.4	9.6
Total operating expenses	28.7	26.9	30.8
Income from operations	32.5	33.0	28.0
Interest income	1.2	0.7	0.8
Interest expense	(0.5)	(0.6)	(0.8)
Other, net	0.1	(0.2)	(0.4)
Total other income (expense)	0.8	(0.1)	(0.4)
Income before income tax expense	33.3	32.9	27.6
Income tax expense (benefit)	(2.1)	1.5	3.5
Net income	35.3%	31.4%	24.1%

Revenue

Revenue by Reportable Segments

	Year Ended				Year Ended			
	January 27, 2019	January 28, 2018	\$ Change	% Change	January 28, 2018	January 29, 2017	\$ Change	% Change
	(\$ in millions)				(\$ in millions)			
GPU	\$ 10,175	\$ 8,137	\$ 2,038	25 %	\$ 8,137	\$ 5,822	\$ 2,315	40 %
Tegra Processor ...	1,541	1,534	7	— %	1,534	824	710	86 %
All Other	—	43	(43)	(100)%	43	264	(221)	(84)%
Total	\$ 11,716	\$ 9,714	\$ 2,002	21 %	\$ 9,714	\$ 6,910	\$ 2,804	41 %

GPU Business. GPU business revenue increased by 25% in fiscal year 2019 compared to fiscal year 2018. This increase was due primarily to 18% growth in sales of GeForce GPU products for gaming, driven by initial sales of Turing-based GPUs for desktops and by high-performance notebooks based on our Max-Q technology. Datacenter revenue, including Tesla, GRID and DGX, increased 52%, reflecting strong sales of our Volta architecture products, including NVIDIA Tesla V100 and DGX systems. Revenue from Quadro GPUs for professional visualization increased 21% due primarily to higher sales across desktop and mobile workstation products. Our PC OEM revenue decreased by 1% driven by the absence of Intel licensing revenue in fiscal year 2019. Revenue from cryptocurrency-specific products in fiscal years 2019 and 2018 was \$306 million and \$273 million, respectively. We expect cryptocurrency-related revenue to be negligible going forward.

GPU business revenue increased by 40% in fiscal year 2018 compared to fiscal year 2017 led by growth in gaming, datacenter and professional visualization. Revenue from sales of GeForce GPU products for gaming increased over 20%, reflecting continued strong demand for our Pascal-based GPU products. Datacenter revenue, including Tesla, GRID and DGX, increased 133%, reflecting strong demand from hyperscale and cloud customers for deep learning training and accelerated GPU computing as well as demand for HPC, DGX AI supercomputing and GRID virtualization platforms. Revenue from Quadro GPUs for professional visualization increased by 12% due primarily to higher sales in both high-end desktop and mobile workstation products. Revenue from GeForce GPU products for mainstream PC OEMs increased by over 90% due primarily to strong demand for GPU products targeted for cryptocurrency mining.

Tegra Processor Business. Tegra Processor business revenue was up slightly in fiscal year 2019 compared to fiscal year 2018. This was driven by an increase of over 15% in automotive revenue, primarily from infotainment modules, production DRIVE PX platforms, and development agreements with automotive companies, offset by a decline of approximately 15% in SOC modules for gaming platforms and related development services.

Tegra Processor business revenue increased by 86% in fiscal year 2018 compared to fiscal year 2017. This was driven by an increase of over 300% in revenue from SOC modules for gaming platforms and development services, and an increase of 15% in automotive revenue, primarily from infotainment modules, DRIVE PX platforms and development agreements for self-driving cars.

All Other. Our patent license agreement with Intel concluded in the first quarter of fiscal year 2018. For fiscal year 2018, we recognized related revenue of \$43 million, down from \$264 million for fiscal year 2017.

Concentration of Revenue

Revenue from sales to customers outside of the United States accounted for 87% of total revenue for each of fiscal years 2019, 2018, and 2017. Revenue by geographic region is allocated to individual countries based on the location to which the products are initially billed even if the revenue is attributable to end customers in a different location.

No single customer represented more than 10% of total revenue for fiscal years 2019 and 2018. In fiscal year 2017, we had one customer that represented 12% of our total revenue.

Gross Profit and Gross Margin

Gross profit consists of total revenue, net of allowances, less cost of revenue. Cost of revenue consists primarily of the cost of semiconductors purchased from subcontractors, including wafer fabrication, assembly, testing and packaging, board and device costs, manufacturing support costs, including labor and overhead associated with such purchases, final test yield fallout, inventory and warranty provisions, memory and component costs, and shipping costs. Cost of revenue also includes development costs for license and service arrangements and stock-based compensation related to personnel associated with manufacturing.

Our overall gross margin was 61.2%, 59.9%, and 58.8% for fiscal years 2019, 2018, and 2017, respectively. The increase in fiscal year 2019 reflects our continued shift toward higher-value platforms, which more than offset the impact of approximately \$128 million in charges for excess DRAM and other components we recorded in the fourth quarter of fiscal year 2019 and a charge of \$57 million we recorded during the third quarter of fiscal year 2019 related to prior architecture components and chips. The increase in fiscal year 2018 was driven primarily by a favorable shift in mix, the growth of our GeForce gaming GPU revenue, and the growth of our datacenter revenue for cloud, deep learning, AI, and graphics virtualization. The increase in fiscal year 2018 was partially offset by the conclusion of our patent license agreement with Intel in the first quarter of fiscal year 2018.

Inventory provisions totaled \$270 million, \$48 million, and \$62 million for fiscal years 2019, 2018, and 2017, respectively. Sales of inventory that was previously written-off or written-down totaled \$41 million, \$35 million, and \$51 million for fiscal years 2019, 2018, and 2017, respectively. As a result, the overall net effect on our gross margin was an unfavorable impact of 2.0% in fiscal year 2019 and insignificant in fiscal years 2018 and 2017.

A discussion of our gross margin results for each of our reportable segments is as follows:

GPU Business. The gross margin of our GPU business increased during fiscal year 2019 when compared to fiscal year 2018, primarily due to strong sales of high-end GeForce gaming GPUs and revenue growth in Datacenter, including Tesla, GRID and DGX, for cloud, deep learning, AI, and graphics virtualization. The gross margin of our GPU business increased during fiscal year 2018 when compared to fiscal year 2017 primarily due to strong sales of our GeForce gaming GPU products and revenue growth in datacenter, including Tesla, GRID and DGX, for cloud, deep learning, AI, and graphics virtualization.

Tegra Processor Business. The gross margin of our Tegra Processor business increased during fiscal year 2019 when compared to fiscal year 2018, primarily due to a favorable mix shift. The gross margin of our Tegra Processor business increased during fiscal year 2018 when compared to fiscal year 2017, primarily due to revenue growth in gaming development platforms and automotive.

Operating Expenses

	Year Ended				Year Ended			
	January 27, 2019	January 28, 2018	\$ Change	% Change	January 28, 2018	January 29, 2017	\$ Change	% Change
	(\$ in millions)				(\$ in millions)			
Research and development expenses	\$ 2,376	\$ 1,797	\$ 579	32%	\$ 1,797	\$ 1,463	\$ 334	23 %
% of net revenue	20.3%	18.5%			18.5%	21.2%		
Sales, general and administrative expenses	991	815	176	22%	815	663	152	23 %
% of net revenue	8.5%	8.4%			8.4%	9.6%		
Restructuring and other charges	—	—	—	—%	—	3	(3)	(100)%
% of net revenue	—%	—%			—%	—%		
Total operating expenses	\$ 3,367	\$ 2,612	\$ 755	29%	\$ 2,612	\$ 2,129	\$ 483	23 %

Research and Development

Research and development expenses increased by 32% in fiscal year 2019 compared to fiscal year 2018 and increased by 23% in fiscal year 2018 compared to fiscal year 2017, driven primarily by employee additions and increases in employee compensation and other related costs, including infrastructure costs and stock-based compensation expense.

Sales, General and Administrative

Sales, general and administrative expenses increased by 22% in fiscal year 2019 compared to fiscal year 2018 and increased by 23% in fiscal year 2018 compared to fiscal year 2017, driven primarily by employee additions and increases in employee compensation and other related costs, including infrastructure costs and stock-based compensation expense.

Total Other Income (Expense)

Interest Income and Interest Expense

Interest income consists of interest earned on cash, cash equivalents and marketable securities. Interest income was \$136 million, \$69 million, and \$54 million in fiscal years 2019, 2018, and 2017, respectively. The increase in interest income was primarily due to higher average invested balances and higher rates from our floating rate securities and the purchase of new securities.

Interest expense is primarily comprised of coupon interest and debt discount amortization related to the 2.20% Notes Due 2021 and 3.20% Notes Due 2026 issued in September 2016, and the Convertible Notes issued in December 2013. Interest expense was \$58 million, \$61 million, and \$58 million in fiscal years 2019, 2018, and 2017, respectively.

Other, Net

Other, net, consists primarily of realized or unrealized gains and losses from non-affiliated investments, losses on early debt conversions of the Convertible Notes, and the impact of changes in foreign currency rates. Other, net, was \$14 million of income during fiscal year 2019, consisting primarily of \$12 million unrealized gains from non-affiliated investments. Other, net, was \$22 million and \$25 million of expense in fiscal years 2018 and 2017, respectively, consisting primarily of \$19 million and \$21 million of losses recognized from early conversions of the Convertible Notes during fiscal years 2018 and 2017, respectively.

Income Taxes

The TCJA, which was enacted in December 2017, significantly changed U.S. tax law, including a reduction of the U.S. federal corporate income tax rate from 35% to 21%, a requirement for companies to pay a one-time transition tax on the earnings of certain foreign subsidiaries that were previously tax deferred and the creation of new taxes (GILTI) on certain foreign-source earnings. As a fiscal year-end taxpayer, certain provisions of the TCJA began to impact us in the fourth quarter of fiscal year 2018, while other provisions impacted us beginning in fiscal year 2019.

We recognized income tax benefit of \$245 million for fiscal year 2019, and income tax expense of \$149 million and \$239 million for fiscal years 2018, and 2017, respectively. Our annual effective tax rate was (6.3)%, 4.7%, and 12.5% for fiscal years 2019, 2018, and 2017, respectively. The decrease in our effective tax rate in fiscal year 2019 as compared to fiscal years 2018 and 2017 was primarily due to a decrease in the U.S. statutory tax rate from 33.9% to 21%, the finalization of the enactment-date income tax effects of the TCJA, higher U.S. federal research tax credits and excess tax benefits related to stock-based compensation in fiscal year 2019.

The decrease in our effective tax rate in fiscal year 2018 as compared to fiscal year 2017 was primarily due to the provisional impact of the tax law changes and recognition of excess tax benefits related to stock-based compensation.

Our effective tax rate for fiscal year 2019 was lower than the U.S. federal statutory rate of 21% due primarily to income earned in jurisdictions, including British Virgin Islands, Hong Kong, China, Taiwan and United Kingdom, where the tax rate was lower than the U.S. federal statutory tax rates, the finalization of the enactment-date income tax effects of the TCJA, favorable recognition of U.S. federal research tax credits, and excess tax benefits related to stock-based compensation.

Our effective tax rate for fiscal years 2018 and 2017 was lower than the blended U.S. federal statutory rate of 33.9% for fiscal year 2018 and 35% for fiscal year 2017 due primarily to income earned in jurisdictions, including British Virgin Islands, Hong Kong, China, Taiwan and United Kingdom, where the tax rate was lower than the U.S. federal statutory tax rates, favorable recognition of U.S. federal research tax credits, the provisional impact of the tax law changes in 2018, and excess tax benefits related to stock-based compensation.

In fiscal year 2018 and the first nine months of fiscal year 2019, we recorded provisional amounts for certain enactment-date effects of the TCJA by applying the SEC guidance in SAB 118 because we had not yet completed our accounting for these effects. Furthermore, under U.S. GAAP, we can make an accounting policy election to either treat taxes due on the GILTI as a current period expense or factor such amounts into our measurement of deferred taxes. Because we were still evaluating the GILTI provisions as of January 28, 2018, we recorded no GILTI-related deferred balances. After further evaluation, we elected to account for GILTI deferred taxes. As of January 27, 2019, we completed our accounting for all of the enactment-date income tax effects of the TCJA and recognized a reduction of \$368 million to the provisional amount recorded at January 28, 2018, primarily relating to the effects of electing to account for GILTI in deferred taxes.

Refer to Note 13 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

Liquidity and Capital Resources

	January 27, 2019	January 28, 2018
	<i>(In millions)</i>	
Cash and cash equivalents	\$ 782	\$ 4,002
Marketable securities	6,640	3,106
Cash, cash equivalents, and marketable securities	<u>\$ 7,422</u>	<u>\$ 7,108</u>

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	<i>(In millions)</i>		
Net cash provided by operating activities	\$ 3,743	\$ 3,502	\$ 1,672
Net cash provided by (used in) investing activities	\$ (4,097)	\$ 1,278	\$ (793)
Net cash provided by (used in) financing activities	\$ (2,866)	\$ (2,544)	\$ 291

As of January 27, 2019, we had \$7.42 billion in cash, cash equivalents and marketable securities, an increase of \$314 million from the end of fiscal year 2018. Our investment policy requires the purchase of highly rated fixed income securities, the diversification of investment types and credit exposures, and certain limits on our portfolio duration.

Cash provided by operating activities increased in fiscal year 2019 compared to fiscal year 2018, primarily due to higher net income, partially offset by changes in working capital. Cash provided by operating activities increased in fiscal year 2018 compared to fiscal year 2017, primarily due to higher net income and changes in working capital.

Cash used in investing activities increased in fiscal year 2019 compared to fiscal year 2018, due to higher purchases and lower sales of marketable securities, partially offset by higher maturities of marketable securities. Cash provided by investing activities for fiscal year 2018 increased from fiscal year 2017, primarily due to a reduction in purchases of marketable securities, partially offset by the purchase of our previously-financed Santa Clara campus building.

Cash used in financing activities increased in fiscal year 2019 compared to fiscal year 2018, due to higher share repurchases and higher tax payments related to employee stock plans, partially offset by lower repayments of Convertible Notes. Cash used in financing activities in fiscal year 2018 increased from fiscal year 2017, primarily due to cash provided from the issuance of \$2.00 billion of Notes in fiscal year 2017 as well as higher repayments of Convertible Notes, tax payments related to employee stock plans, share repurchases and dividend payments in fiscal year 2018.

Liquidity

Our primary sources of liquidity are our cash and cash equivalents, our marketable securities, and the cash generated by our operations. As of January 27, 2019 and January 28, 2018, we had \$7.42 billion and \$7.11 billion, respectively, in cash, cash equivalents and marketable securities. Our marketable securities consist of debt securities issued by the U.S. government and its agencies, highly rated corporations and financial institutions, asset-backed issuers, mortgage-backed securities by government-sponsored enterprises, and foreign government entities. These marketable securities are denominated in United States dollars. Refer to Critical Accounting Policies and Estimates in Part II, Item 7, Quantitative and Qualitative Disclosures About Market Risk in Part II, Item 7A and Note 7 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

As a result of the TCJA, substantially all of our cash, cash equivalents and marketable securities held outside of the United States as of January 27, 2019 are available for use in the United States without incurring additional U.S. federal income taxes. Refer to Note 13 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

Capital Return to Shareholders

We previously announced our plan to return \$1.25 billion to shareholders in fiscal year 2019 and an additional \$3.00 billion by the end of fiscal year 2020 - some of which would begin in the fourth quarter of fiscal year 2019. During fiscal year 2019, we repurchased a total of 9 million shares for \$1.58 billion, including \$700 million of the \$3.00 billion, and paid \$371 million in cash dividends.

We intend to return the remaining \$2.30 billion of the \$3.00 billion to shareholders by the end of fiscal year 2020 through a combination of share repurchases and cash dividends.

In November 2018, the Board authorized an additional \$7.00 billion under our share repurchase program and extended it through the end of December 2022. As of January 27, 2019, we were authorized to repurchase additional shares of our common stock up to \$7.24 billion.

In November 2018, we also announced a 7% increase in our quarterly cash dividend to \$0.16 per share from \$0.15 per share.

Our cash dividend program and the payment of future cash dividends under that program are subject to our Board's continuing determination that the dividend program and the declaration of dividends thereunder are in the best interests of our shareholders. Refer to Note 14 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for further discussion.

Notes Due 2021 and Notes Due 2026

In fiscal year 2017, we issued \$1.00 billion of the Notes Due 2021 and \$1.00 billion of the Notes Due 2026, collectively, the Notes. The net proceeds from the Notes were \$1.98 billion, after deducting debt discounts and issuance costs.

Revolving Credit Facility

We have a Credit Agreement under which we may borrow up to \$575 million for general corporate purposes and can obtain revolving loan commitments up to \$425 million. As of January 27, 2019, we had not borrowed any amounts under this agreement.

Commercial Paper

We have a \$575 million commercial paper program to support general corporate purposes. As of January 27, 2019, we had not issued any commercial paper.

Refer to Note 11 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for further discussion.

Operating Capital and Capital Expenditure Requirements

In fiscal year 2019, we began construction on a 750 thousand square foot building on our Santa Clara campus, which is currently targeted for completion in fiscal year 2022. We believe that our existing cash balances and anticipated cash flows from operations will be sufficient to meet our operating requirements for at least the next twelve months.

Off-Balance Sheet Arrangements

As of January 27, 2019, we had no material off-balance sheet arrangements as defined by applicable SEC regulations.

Contractual Obligations

The following table summarizes our contractual obligations as of January 27, 2019:

Contractual Obligations	Payment Due By Period					
	Total	Less than 1 Year	1-3 Years	4-5 Years	More than 5 Years	All Other
	<i>(In millions)</i>					
Long-term debt (1)	\$ 2,302	\$ 54	\$ 1,100	\$ 64	\$ 1,084	\$ —
Inventory purchase obligations	912	912	—	—	—	—
Transition tax payable (2)	384	33	67	96	188	—
Uncertain tax positions, interest and penalties (3)	163	—	—	—	—	163
Operating leases	683	100	187	131	265	—
Capital purchase obligations	258	192	66	—	—	—
Total contractual obligations	<u>\$ 4,702</u>	<u>\$ 1,291</u>	<u>\$ 1,420</u>	<u>\$ 291</u>	<u>\$ 1,537</u>	<u>\$ 163</u>

- (1) Represents the aggregate principal amount of \$2.00 billion and anticipated interest payments of \$302 million for the Notes. Refer to Note 11 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K.
- (2) Represents our remaining tax payable of the one-time transition tax that resulted from enactment of the TCJA in fiscal year 2018. As of January 27, 2019, we have paid the first installment of \$33 million. The remaining will be payable in seven annual installments. The next installment of \$33 million is classified as a current income tax payable. The installment amounts are equal to 8% of the total liability, payable in fiscal years 2019 through 2023, 15% in fiscal year 2024, 20% in fiscal year 2025 and 25% in fiscal year 2026. Refer to Note 13 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K, for additional information about the one-time transition tax.
- (3) Represents unrecognized tax benefits of \$163 million which consists of \$142 million and the related interest and penalties of \$21 million recorded in non-current income tax payable as of January 27, 2019. We are unable to reasonably estimate the timing of any potential tax liability or interest/penalty payments in individual years due to uncertainties in the underlying income tax positions and the timing of the effective settlement of such tax positions.

Adoption of New and Recently Issued Accounting Pronouncements

Refer to Note 1 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for a discussion of adoption of new and recently issued accounting pronouncements.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Investment and Interest Rate Risk

We are exposed to interest rate risk related to our floating and fixed-rate investment portfolio and outstanding debt. The investment portfolio is managed consistent with our overall liquidity strategy in support of both working capital needs and strategic growth of our businesses.

As of January 27, 2019, we performed a sensitivity analysis on our floating and fixed rate financial investments. According to our analysis, parallel shifts in the yield curve of plus or minus 0.5% would result in a decrease in fair value for these investments of \$8 million, or an increase in fair value for these investments of \$7 million, respectively.

In fiscal year 2017, we issued \$1.00 billion of the Notes Due 2021 and \$1.00 billion of the Notes Due 2026. We carry the Notes at face value less unamortized discount on our Consolidated Balance Sheets. As the Notes bear interest at a fixed rate, we have no financial statement risk associated with changes in interest rates. Refer to Note 11 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

Foreign Exchange Rate Risk

We consider our direct exposure to foreign exchange rate fluctuations to be minimal. Gains or losses from foreign currency remeasurement are included in other income or expense and to date have not been significant. The impact of foreign currency transaction gain or loss included in determining net income was not significant for fiscal years 2019, 2018, and 2017.

Sales and arrangements with third-party manufacturers provide for pricing and payment in United States dollars, and, therefore, are not subject to exchange rate fluctuations. Increases in the value of the United States' dollar relative to other currencies would make our products more expensive, which could negatively impact our ability to compete. Conversely, decreases in the value of the United States' dollar relative to other currencies could result in our suppliers raising their prices in order to continue doing business with us. Additionally, we have international operations and incur expenditures in currencies other than U.S. dollars. Our operating expenses benefit from a stronger dollar and are adversely affected by a weaker dollar.

We use foreign currency forward contracts to mitigate the impact of foreign currency exchange rate movements on our operating expenses. We designate these contracts as cash flow hedges and assess the effectiveness of the hedge relationships on a spot to spot basis. Gains or losses on the contracts are recorded in accumulated other comprehensive income or loss, and then reclassified to operating expense when the related operating expenses are recognized in earnings or ineffectiveness should occur.

We also use foreign currency forward contracts to mitigate the impact of foreign currency movements on monetary assets and liabilities that are denominated in currencies other than U.S. dollar. These forward contracts were not designated for hedge accounting treatment. Therefore, the change in fair value of these contracts is recorded in other income or expense and offsets the change in fair value of the hedged foreign currency denominated monetary assets and liabilities, which is also recorded in other income or expense.

Refer to Note 10 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The information required by this Item is set forth in our Consolidated Financial Statements and Notes thereto included in this Annual Report on Form 10-K.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Controls and Procedures

Disclosure Controls and Procedures

Based on their evaluation as of January 27, 2019, our management, including our Chief Executive Officer and Chief Financial Officer, has concluded that our disclosure controls and procedures (as defined in Rule 13a-15(e) under the Securities Exchange Act of 1934, as amended, or the Exchange Act) were effective to provide reasonable assurance.

Management's Annual Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rule 13a-15(f). Under the supervision and with the participation of our management, including our Chief Executive Officer and Chief Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting as of January 27, 2019 based on the criteria set forth in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based on our evaluation under the criteria set forth in *Internal Control - Integrated Framework*, our management concluded that our internal control over financial reporting was effective as of January 27, 2019.

The effectiveness of our internal control over financial reporting as of January 27, 2019 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in its report which is included herein.

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting during our last fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Inherent Limitations on Effectiveness of Controls

Our management, including our Chief Executive Officer and Chief Financial Officer, does not expect that our disclosure controls and procedures or our internal controls, will prevent all error and all fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within NVIDIA have been detected.

ITEM 9B. OTHER INFORMATION

None.

PART III

Certain information required by Part III is omitted from this report because we will file with the SEC a definitive proxy statement pursuant to Regulation 14A, or the 2019 Proxy Statement, no later than 120 days after the end of fiscal year 2019, and certain information included therein is incorporated herein by reference.

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Identification of Directors

Information regarding directors required by this item will be contained in our 2019 Proxy Statement under the caption "Proposal 1 - Election of Directors," and is hereby incorporated by reference.

Identification of Executive Officers

Reference is made to the information regarding executive officers appearing under the heading "Executive Officers of the Registrant" in Part I of this Annual Report on Form 10-K, which information is hereby incorporated by reference.

Identification of Audit Committee and Financial Experts

Information regarding our Audit Committee required by this item will be contained in our 2019 Proxy Statement under the captions "Report of the Audit Committee of the Board of Directors" and "Information About the Board of Directors and Corporate Governance," and is hereby incorporated by reference.

Material Changes to Procedures for Recommending Directors

Information regarding procedures for recommending directors required by this item will be contained in our 2019 Proxy Statement under the caption "Information About the Board of Directors and Corporate Governance," and is hereby incorporated by reference.

Compliance with Section 16(a) of the Exchange Act

Information regarding compliance with Section 16(a) of the Exchange Act required by this item will be contained in our 2019 Proxy Statement under the caption "Section 16(a) Beneficial Ownership Reporting Compliance," and is hereby incorporated by reference.

Code of Conduct

Information regarding our Code of Conduct required by this item will be contained in our 2019 Proxy Statement under the caption "Information About the Board of Directors and Corporate Governance - Code of Conduct," and is hereby incorporated by reference. The full text of our Code of Conduct and Financial Team Code of Conduct are published on the Investor Relations portion of our website, under Corporate Governance, at www.nvidia.com. The contents of our website are not a part of this Annual Report on Form 10-K.

ITEM 11. EXECUTIVE COMPENSATION

Information regarding our executive compensation required by this item will be contained in our 2019 Proxy Statement under the captions "Executive Compensation", "Compensation Committee Interlocks and Insider Participation", "Director Compensation" and "Compensation Committee Report," and is hereby incorporated by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

Ownership of NVIDIA Securities

Information regarding ownership of NVIDIA securities required by this item will be contained in our 2019 Proxy Statement under the caption "Security Ownership of Certain Beneficial Owners and Management," and is hereby incorporated by reference.

Equity Compensation Plan Information

Information regarding our equity compensation plans required by this item will be contained in our 2019 Proxy Statement under the caption "Equity Compensation Plan Information," and is hereby incorporated by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information regarding related transactions and director independence required by this item will be contained in our 2019 Proxy Statement under the captions "Review of Transactions with Related Persons" and "Information About the Board of Directors and Corporate Governance - Independence of the Members of the Board of Directors," and is hereby incorporated by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

Information regarding accounting fees and services required by this item will be contained in our 2019 Proxy Statement under the caption "Fees Billed by the Independent Registered Public Accounting Firm," and is hereby incorporated by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULE

	<u>Page</u>
(a) 1. Financial Statements	
<u>Report of Independent Registered Public Accounting Firm</u>	<u>39</u>
<u>Consolidated Statements of Income for the years ended January 27, 2019, January 28, 2018, and January 29, 2017</u>	<u>41</u>
<u>Consolidated Statements of Comprehensive Income for the years ended January 27, 2019, January 28, 2018, and January 29, 2017</u>	<u>42</u>
<u>Consolidated Balance Sheets as of January 27, 2019 and January 28, 2018</u>	<u>43</u>
<u>Consolidated Statements of Shareholders' Equity for the years ended January 27, 2019, January 28, 2018, and January 29, 2017</u>	<u>44</u>
<u>Consolidated Statements of Cash Flows for the years ended January 27, 2019, January 28, 2018, and January 29, 2017</u>	<u>45</u>
<u>Notes to the Consolidated Financial Statements</u>	<u>47</u>
2. Financial Statement Schedule	
<u>Schedule II Valuation and Qualifying Accounts for the years ended January 27, 2019, January 28, 2018, and January 29, 2017</u>	<u>75</u>
3. Exhibits	
<u>The exhibits listed in the accompanying index to exhibits are filed or incorporated by reference as a part of this Annual Report on Form 10-K.</u>	<u>76</u>

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and Board of Directors of NVIDIA Corporation

Opinions on the Financial Statements and Internal Control over Financial Reporting

We have audited the accompanying consolidated balance sheets of NVIDIA Corporation and its subsidiaries as of January 27, 2019 and January 28, 2018, and the related consolidated statements of income, comprehensive income, shareholders' equity and cash flows for each of the three years in the period ended January 27, 2019, including the related notes and financial statement schedule listed in the index appearing under Item 15(a)(2) (collectively referred to as the "consolidated financial statements"). We also have audited the Company's internal control over financial reporting as of January 27, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO).

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of the Company as of January 27, 2019 and January 28, 2018, and the results of its operations and its cash flows for each of the three years in the period ended January 27, 2019 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of January 27, 2019, based on criteria established in Internal Control - Integrated Framework (2013) issued by the COSO.

Basis for Opinions

The Company's management is responsible for these consolidated financial statements, for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Annual Report on Internal Control over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on the Company's consolidated financial statements and on the Company's internal control over financial reporting based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud, and whether effective internal control over financial reporting was maintained in all material respects.

Our audits of the consolidated financial statements included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the consolidated financial statements. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PricewaterhouseCoopers LLP

San Jose, California

February 21, 2019

We have served as the Company's auditor since 2004.

NVIDIA CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF INCOME
(In millions, except per share data)

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
Revenue	\$ 11,716	\$ 9,714	\$ 6,910
Cost of revenue	4,545	3,892	2,847
Gross profit	7,171	5,822	4,063
Operating expenses			
Research and development	2,376	1,797	1,463
Sales, general and administrative	991	815	663
Restructuring and other charges	—	—	3
Total operating expenses	3,367	2,612	2,129
Income from operations	3,804	3,210	1,934
Interest income	136	69	54
Interest expense	(58)	(61)	(58)
Other, net	14	(22)	(25)
Total other income (expense)	92	(14)	(29)
Income before income tax	3,896	3,196	1,905
Income tax expense (benefit)	(245)	149	239
Net income	\$ 4,141	\$ 3,047	\$ 1,666
Net income per share:			
Basic	\$ 6.81	\$ 5.09	\$ 3.08
Diluted	\$ 6.63	\$ 4.82	\$ 2.57
Weighted average shares used in per share computation:			
Basic	608	599	541
Diluted	625	632	649
Cash dividends declared and paid per common share	\$ 0.610	\$ 0.570	\$ 0.485

See accompanying notes to the consolidated financial statements.

NVIDIA CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF COMPREHENSIVE INCOME
(In millions)

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
Net income	\$ 4,141	\$ 3,047	\$ 1,666
Other comprehensive income (loss), net of tax			
Available-for-sale debt securities:			
Net unrealized gain (loss)	10	(5)	(17)
Reclassification adjustments for net realized gain included in net income	1	1	1
Net change in unrealized gain (loss)	11	(4)	(16)
Cash flow hedges:			
Net unrealized gain (loss)	6	(1)	2
Reclassification adjustments for net realized gain (loss) included in net income	(11)	3	2
Net change in unrealized gain (loss)	(5)	2	4
Other comprehensive income (loss), net of tax	6	(2)	(12)
Total comprehensive income	\$ 4,147	\$ 3,045	\$ 1,654

See accompanying notes to the consolidated financial statements.

NVIDIA CORPORATION AND SUBSIDIARIES
CONSOLIDATED BALANCE SHEETS
(In millions, except par value)

	January 27, 2019	January 28, 2018
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 782	\$ 4,002
Marketable securities	6,640	3,106
Accounts receivable, net	1,424	1,265
Inventories	1,575	796
Prepaid expenses and other current assets	136	86
Total current assets	10,557	9,255
Property and equipment, net	1,404	997
Goodwill	618	618
Intangible assets, net	45	52
Other assets	668	319
Total assets	<u>\$ 13,292</u>	<u>\$ 11,241</u>
LIABILITIES AND SHAREHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	\$ 511	\$ 596
Accrued and other current liabilities	818	542
Convertible short-term debt	—	15
Total current liabilities	1,329	1,153
Long-term debt	1,988	1,985
Other long-term liabilities	633	632
Total liabilities	3,950	3,770
Commitments and contingencies - see Note 12		
Shareholders' equity:		
Preferred stock, \$.001 par value; 2 shares authorized; none issued	—	—
Common stock, \$.001 par value; 2,000 shares authorized; 945 shares issued and 606 outstanding as of January 27, 2019; 932 shares issued and 606 outstanding as of January 28, 2018	1	1
Additional paid-in capital	6,051	5,351
Treasury stock, at cost (339 shares in 2019 and 326 shares in 2018)	(9,263)	(6,650)
Accumulated other comprehensive loss	(12)	(18)
Retained earnings	12,565	8,787
Total shareholders' equity	9,342	7,471
Total liabilities and shareholders' equity	<u>\$ 13,292</u>	<u>\$ 11,241</u>

See accompanying notes to the consolidated financial statements.

NVIDIA CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY

(In millions, except per share data)	Common Stock Outstanding		Additional Paid-in Capital	Treasury Stock	Accumulated Other Comprehensive Income (Loss)	Retained Earnings	Total Shareholders' Equity
	Shares	Amount					
Balances, January 31, 2016	539	\$ 1	\$ 4,170	\$ (4,048)	\$ (4)	\$ 4,350	\$ 4,469
Retained earnings adjustment due to adoption of an accounting standard related to stock-based compensation	—	—	—	—	—	353	353
Other comprehensive loss	—	—	—	—	(12)	—	(12)
Net income	—	—	—	—	—	1,666	1,666
Issuance of common stock in exchange for warrants	44	—	(1)	—	—	—	(1)
Convertible debt conversion	23	—	(6)	—	—	—	(6)
Issuance of common stock from stock plans	20	—	167	—	—	—	167
Tax withholding related to vesting of restricted stock units	(3)	—	—	(177)	—	—	(177)
Share repurchase	(15)	—	—	(739)	—	—	(739)
Exercise of convertible note hedges	(23)	—	75	(75)	—	—	—
Cash dividends declared and paid (\$0.485 per common share)	—	—	—	—	—	(261)	(261)
Stock-based compensation	—	—	248	—	—	—	248
Reclassification of convertible debt conversion obligation	—	—	55	—	—	—	55
Balances, January 29, 2017	585	1	4,708	(5,039)	(16)	6,108	5,762
Retained earnings adjustment due to adoption of an accounting standard related to income tax consequences of an intra-entity transfer of an asset	—	—	—	—	—	(27)	(27)
Other comprehensive loss	—	—	—	—	(2)	—	(2)
Net income	—	—	—	—	—	3,047	3,047
Issuance of common stock in exchange for warrants	13	—	—	—	—	—	—
Convertible debt conversion	33	—	(7)	—	—	—	(7)
Issuance of common stock from stock plans	18	—	138	—	—	—	138
Tax withholding related to vesting of restricted stock units	(4)	—	—	(612)	—	—	(612)
Share repurchase	(6)	—	—	(909)	—	—	(909)
Exercise of convertible note hedges	(33)	—	90	(90)	—	—	—
Cash dividends declared and paid (\$0.570 per common share)	—	—	—	—	—	(341)	(341)
Stock-based compensation	—	—	391	—	—	—	391
Reclassification of convertible debt conversion obligation	—	—	31	—	—	—	31
Balances, January 28, 2018	606	1	5,351	(6,650)	(18)	8,787	7,471
Retained earnings adjustment due to adoption of new revenue accounting standard	—	—	—	—	—	8	8
Other comprehensive loss	—	—	—	—	6	—	6
Net income	—	—	—	—	—	4,141	4,141
Convertible debt conversion	1	—	—	—	—	—	—
Issuance of common stock from stock plans	13	—	137	—	—	—	137
Tax withholding related to vesting of restricted stock units	(4)	—	—	(1,032)	—	—	(1,032)
Share repurchase	(9)	—	—	(1,579)	—	—	(1,579)
Exercise of convertible note hedges	(1)	—	2	(2)	—	—	—
Cash dividends declared and paid (\$0.610 per common share)	—	—	—	—	—	(371)	(371)
Stock-based compensation	—	—	561	—	—	—	561
Balances, January 27, 2019	606	\$ 1	\$ 6,051	\$ (9,263)	\$ (12)	\$ 12,565	\$ 9,342

See accompanying notes to the consolidated financial statements.

NVIDIA CORPORATION AND SUBSIDIARIES
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In millions)

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
Cash flows from operating activities:			
Net income	\$ 4,141	\$ 3,047	\$ 1,666
Adjustments to reconcile net income to net cash provided by operating activities:			
Stock-based compensation expense	557	391	247
Depreciation and amortization	262	199	187
Deferred income taxes	(315)	(359)	197
Loss on early debt conversions	—	19	21
Other	(45)	20	33
Changes in operating assets and liabilities:			
Accounts receivable	(149)	(440)	(321)
Inventories	(776)	—	(375)
Prepaid expenses and other assets	(55)	21	(18)
Accounts payable	(135)	90	184
Accrued and other current liabilities	256	33	(135)
Other long-term liabilities	2	481	(14)
Net cash provided by operating activities	3,743	3,502	1,672
Cash flows from investing activities:			
Proceeds from maturities of marketable securities	7,232	1,078	969
Proceeds from sales of marketable securities	428	863	1,546
Purchases of marketable securities	(11,148)	(36)	(3,134)
Purchases of property and equipment and intangible assets	(600)	(593)	(176)
Investment in non-affiliates	(9)	(36)	(5)
Proceeds from sale of long-lived assets and investments	—	2	7
Net cash provided by (used in) investing activities	(4,097)	1,278	(793)
Cash flows from financing activities:			
Proceeds from issuance of debt	—	—	1,988
Payments related to repurchases of common stock	(1,579)	(909)	(739)
Repayment of Convertible Notes	(16)	(812)	(673)
Dividends paid	(371)	(341)	(261)
Proceeds related to employee stock plans	137	139	167
Payments related to tax on restricted stock units	(1,032)	(612)	(176)
Other	(5)	(9)	(15)
Net cash provided by (used in) financing activities	(2,866)	(2,544)	291
Change in cash and cash equivalents	(3,220)	2,236	1,170
Cash and cash equivalents at beginning of period	4,002	1,766	596
Cash and cash equivalents at end of period	\$ 782	\$ 4,002	\$ 1,766

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
<i>Supplemental disclosures of cash flow information:</i>			
Cash paid for income taxes, net	\$ 61	\$ 22	\$ 14
Cash paid for interest	\$ 55	\$ 55	\$ 13
<i>Non-cash investing and financing activity:</i>			
Assets acquired by assuming related liabilities	\$ 76	\$ 36	\$ 16

See accompanying notes to the consolidated financial statements.

NVIDIA CORPORATION AND SUBSIDIARIES
NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS

Note 1 - Organization and Summary of Significant Accounting Policies

Our Company

Headquartered in Santa Clara, California, NVIDIA was incorporated in California in April 1993 and reincorporated in Delaware in April 1998.

All references to "NVIDIA," "we," "us," "our" or the "Company" mean NVIDIA Corporation and its subsidiaries.

Fiscal Year

We operate on a 52- or 53-week year, ending on the last Sunday in January. Fiscal years 2019, 2018 and 2017 were 52-week years.

Reclassifications

Certain prior fiscal year balances have been reclassified to conform to the current fiscal year presentation.

Principles of Consolidation

Our consolidated financial statements include the accounts of NVIDIA Corporation and our wholly-owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

Use of Estimates

The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosures of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenue and expenses during the reporting period. Actual results could differ materially from our estimates. On an on-going basis, we evaluate our estimates, including those related to revenue recognition, cash equivalents and marketable securities, accounts receivable, inventories, income taxes, goodwill, stock-based compensation, litigation, investigation and settlement costs, restructuring and other charges, and other contingencies. These estimates are based on historical facts and various other assumptions that we believe are reasonable.

Revenue Recognition

We derive our revenue from product sales, including hardware and systems, license and development arrangements, and software licensing. We determine revenue recognition through the following steps: (1) identification of the contract with a customer; (2) identification of the performance obligations in the contract; (3) determination of the transaction price; (4) allocation of the transaction price to the performance obligations in the contract; and (5) recognition of revenue when, or as, we satisfy a performance obligation.

Product Sales Revenue

Revenue from product sales is recognized upon transfer of control of promised products to customers in an amount that reflects the consideration we expect to receive in exchange for those products. Revenue is recognized net of allowances for returns, customer programs and any taxes collected from customers.

For products sold with a right of return, we record a reduction to revenue by establishing a sales return allowance for estimated product returns at the time revenue is recognized, based primarily on historical return rates. However, if product returns for a fiscal period are anticipated to exceed historical return rates, we may determine that additional sales return allowances are required to properly reflect our estimated exposure for product returns.

Our customer programs involve rebates, which are designed to serve as sales incentives to resellers of our products in various target markets, and marketing development funds, or MDFs, which represent monies paid to our partners that are earmarked for market segment development and are designed to support our partners' activities while also promoting NVIDIA products. We account for customer programs as a reduction to revenue and accrue for potential rebates and MDFs based on the amount we expect to be claimed by customers.

License and Development Arrangements

Our license and development arrangements with customers typically require significant customization of our intellectual property components. As a result, we recognize the revenue from the license and the revenue from the development services as a single performance obligation over the period in which the development services are performed. We measure progress to completion based on actual cost incurred to date as a percentage of the estimated total cost required to complete each project. If a loss on an arrangement becomes probable during a period, we record a provision for such loss in that period.

Software Licensing

Our software licenses provide our customers with a right to use the software when it is made available to the customer. Customers may purchase either perpetual licenses or subscriptions to licenses, which differ mainly in the duration over which the customer benefits from the software. Software licenses are frequently sold along with post-contract customer support, or PCS. For such arrangements, we allocate revenue to the software license and PCS on a relative standalone selling price basis by maximizing the use of observable inputs to determine the standalone selling price for each performance obligation. Revenue from software licenses is recognized up front when the software is made available to the customer. PCS revenue is recognized ratably over the service period, or as services are performed.

Advertising Expenses

We expense advertising costs in the period in which they are incurred. Advertising expenses for fiscal years 2019, 2018, and 2017 were \$21 million, \$25 million, and \$17 million, respectively.

Product Warranties

We generally offer a limited warranty to end-users that ranges from one to three years for products in order to repair or replace products for any manufacturing defects or hardware component failures. Cost of revenue includes the estimated cost of product warranties that are calculated at the point of revenue recognition. Under limited circumstances, we may offer an extended limited warranty to customers for certain products. We also accrue for known warranty and indemnification issues if a loss is probable and can be reasonably estimated.

Stock-based Compensation

We use the closing trading price of our common stock on the date of grant, minus a dividend yield discount, as the fair value of awards of restricted stock units, or RSUs, and performance stock units that are based on our corporate financial performance targets, or PSUs. We use a Monte Carlo simulation on the date of grant to estimate the fair value of performance stock units that are based on market conditions, or market-based PSUs. The compensation expense for RSUs and market-based PSUs is recognized using a straight-line attribution method over the requisite employee service period while compensation expense for PSUs is recognized using an accelerated amortization model. We estimate the fair value of shares to be issued under our employee stock purchase plan, or ESPP, using the Black-Scholes model at the commencement of an offering period in March and September of each year. Stock-based compensation for our ESPP is expensed using an accelerated amortization model. Additionally, we estimate forfeitures annually based on historical experience and revise the estimates of forfeiture in subsequent periods if actual forfeitures differ from those estimates.

Litigation, Investigation and Settlement Costs

From time to time, we are involved in legal actions and/or investigations by regulatory bodies. There are many uncertainties associated with any litigation or investigation, and we cannot be certain that these actions or other third-party claims against us will be resolved without litigation, fines and/or substantial settlement payments. If information becomes available that causes us to determine that a loss in any of our pending litigation, investigations or settlements is probable, and we can reasonably estimate the loss associated with such events, we will record the loss in accordance with U.S. GAAP. However, the actual liability in any such litigation or investigation may be materially different from our estimates, which could require us to record additional costs.

Foreign Currency Remeasurement

We use the United States dollar as our functional currency for all of our subsidiaries. Foreign currency monetary assets and liabilities are remeasured into United States dollars at end-of-period exchange rates. Non-monetary assets and liabilities such as property and equipment, and equity are remeasured at historical exchange rates. Revenue and expenses are remeasured at average exchange rates in effect during each period, except for those expenses related to the previously noted balance sheet amounts, which are remeasured at historical exchange rates. Gains or losses from foreign currency

remeasurement are included in other income or expense in our Consolidated Statements of Income and to date have not been significant.

Income Taxes

We recognize federal, state and foreign current tax liabilities or assets based on our estimate of taxes payable or refundable in the current fiscal year by tax jurisdiction. We recognize federal, state and foreign deferred tax assets or liabilities, as appropriate, for our estimate of future tax effects attributable to temporary differences and carryforwards; and we record a valuation allowance to reduce any deferred tax assets by the amount of any tax benefits that, based on available evidence and judgment, are not expected to be realized.

Our calculation of deferred tax assets and liabilities is based on certain estimates and judgments and involves dealing with uncertainties in the application of complex tax laws. Our estimates of deferred tax assets and liabilities may change based, in part, on added certainty or finality to an anticipated outcome, changes in accounting standards or tax laws in the United States, or foreign jurisdictions where we operate, or changes in other facts or circumstances. In addition, we recognize liabilities for potential United States and foreign income tax contingencies based on our estimate of whether, and the extent to which, additional taxes may be due. If we determine that payment of these amounts is unnecessary or if the recorded tax liability is less than our current assessment, we may be required to recognize an income tax benefit or additional income tax expense in our financial statements accordingly.

As of January 27, 2019, we had a valuation allowance of \$562 million related to state and certain foreign deferred tax assets that management determined are not likely to be realized due to projections of future taxable income and potential utilization limitations of tax attributes acquired as a result of stock ownership changes. To the extent realization of the deferred tax assets becomes more-likely-than-not, we would recognize such deferred tax asset as an income tax benefit during the period.

We recognize the benefit from a tax position only if it is more-likely-than-not that the position would be sustained upon audit based solely on the technical merits of the tax position. Our policy is to include interest and penalties related to unrecognized tax benefits as a component of income tax expense.

The Tax Cuts and Jobs Act, or TCJA, which was enacted in December 2017, significantly changes U.S. tax law, including a reduction of the U.S. federal corporate income tax rate from 35% to 21%, a requirement for companies to pay a one-time transition tax on the earnings of certain foreign subsidiaries that were previously tax deferred, and the creation of new taxes (global intangible low-taxed income, or GILTI) on certain foreign-source earnings. As a fiscal year-end taxpayer, certain provisions of the TCJA began to impact us in the fourth quarter of fiscal year 2018, while other provisions impacted us beginning in fiscal year 2019. The Securities and Exchange Commission, or the SEC, had provided guidance in Staff Accounting Bulletin No. 118, Income Tax Accounting Implications of the Tax Cuts and Jobs Act (SAB 118), which allowed companies to record provisional amounts during a measurement period up to one year from the enactment date. As of January 27, 2019, we completed our accounting for all of the enactment-date income tax effects of the TCJA and elected to account for GILTI in deferred taxes. Refer to Note 13 of these Notes to the Consolidated Financial Statements for additional information.

Net Income Per Share

Basic net income per share is computed using the weighted average number of common shares outstanding during the period. Diluted net income per share is computed using the weighted average number of common and potentially dilutive shares outstanding during the period, using the treasury stock method. Under the treasury stock method, the effect of equity awards outstanding is not included in the computation of diluted net income per share for periods when their effect is anti-dilutive. Additionally, we issued convertible notes with a net settlement feature that required us, upon conversion, to settle the principal amount of debt for cash and the conversion premium for cash or shares of our common stock. Our Convertible Notes, Note Hedges, and related Warrants contained various conversion features, which are further described in Note 11 of these Notes to the Consolidated Financial Statements. The potentially dilutive shares resulting from the Convertible Notes and Warrants under the treasury stock method were included in the calculation of diluted income per share when their inclusion was dilutive. However, the Note Hedges were not included in the calculation of diluted net income per share unless actually exercised, as their pre-exercised effect would have been anti-dilutive under the treasury stock method.

Cash and Cash Equivalents

We consider all highly liquid investments that are readily convertible into cash and have an original maturity of three months or less at the time of purchase to be cash equivalents.

Marketable Securities

Marketable securities consist of highly liquid debt investments with maturities of greater than three months when purchased. We generally classify our marketable securities at the date of acquisition as available-for-sale. These debt securities are reported at fair value with the related unrealized gains and losses included in accumulated other comprehensive income or loss, a component of shareholders' equity, net of tax. The fair value of interest-bearing debt securities includes accrued interest. Any unrealized losses which are considered to be other-than-temporary impairments are recorded in the other income or expense, net, section of our Consolidated Statements of Income. Realized gains and losses on the sale of marketable securities are determined using the specific-identification method and recorded in the other income or expense, net, section of our Consolidated Statements of Income.

All of our available-for-sale debt investments are subject to a periodic impairment review. We record a charge to earnings when a decline in fair value is significantly below cost basis and judged to be other-than-temporary or have other indicators of impairments. If the fair value of an available-for-sale debt instrument is less than its amortized cost basis, an other-than-temporary impairment is triggered in circumstances where (1) we intend to sell the instrument, (2) it is more likely than not that we will be required to sell the instrument before recovery of its amortized cost basis, or (3) a credit loss exists where we do not expect to recover the entire amortized cost basis of the instrument. In these situations, we recognize an other-than-temporary impairment in earnings equal to the entire difference between the debt instruments' amortized cost basis and its fair value. For available-for-sale debt instruments that are considered other-than-temporarily impaired due to the existence of a credit loss, if we do not intend to sell and it is not more likely than not that we will not be required to sell the instrument before recovery of its remaining amortized cost basis (amortized cost basis less any current-period credit loss), we separate the amount of the impairment into the amount that is credit related and the amount due to all other factors. The credit loss component is recognized in earnings while loss related to all other factors is recorded in accumulated other comprehensive income or loss.

Fair Value of Financial Instruments

The carrying value of cash equivalents, accounts receivable, accounts payable and accrued liabilities approximate their fair values due to their relatively short maturities as of January 27, 2019 and January 28, 2018. Marketable securities are comprised of available-for-sale securities that are reported at fair value with the related unrealized gains or losses included in accumulated other comprehensive income or loss, a component of shareholders' equity, net of tax. Fair value of the marketable securities is determined based on quoted market prices. Derivative instruments are recognized as either assets or liabilities and are measured at fair value. The accounting for changes in the fair value of a derivative depends on the intended use of the derivative and the resulting designation. For derivative instruments designated as fair value hedges, the gains or losses are recognized in earnings in the periods of change together with the offsetting losses or gains on the hedged items attributed to the risk being hedged. For derivative instruments designated as cash-flow hedges, the effective portion of the gains or losses on the derivatives is initially reported as a component of other comprehensive income or loss and is subsequently recognized in earnings when the hedged exposure is recognized in earnings. For derivative instruments not designated for hedge accounting, changes in fair value are recognized in earnings.

Concentration of Credit Risk

Financial instruments that potentially subject us to concentrations of credit risk consist primarily of cash equivalents, marketable securities, and accounts receivable. Our investment policy requires the purchase of highly-rated fixed income securities, the diversification of investment type and credit exposures, and includes certain limits on our portfolio duration. Accounts receivable from significant customers, those representing 10% or more of total accounts receivable, aggregated approximately 19% of our accounts receivable balance from one customer as of January 27, 2019 and 28% of our account receivable balance from two customers as of January 28, 2018. We perform ongoing credit evaluations of our customers' financial condition and maintain an allowance for potential credit losses. This allowance consists of an amount identified for specific customers and an amount based on overall estimated exposure. Our overall estimated exposure excludes amounts covered by credit insurance and letters of credit.

Accounts Receivable

We maintain an allowance for doubtful accounts receivable for estimated losses resulting from the inability of our customers to make required payments. We determine this allowance by identifying amounts for specific customer issues as well as amounts based on overall estimated exposure. Factors impacting the allowance include the level of gross receivables, the financial condition of our customers and the extent to which balances are covered by credit insurance or letters of credit.

Inventories

Inventory cost is computed on an adjusted standard basis, which approximates actual cost on an average or first-in, first-out basis. Inventory costs consist primarily of the cost of semiconductors purchased from subcontractors, including wafer fabrication, assembly, testing and packaging, manufacturing support costs, including labor and overhead associated with such purchases, final test yield fallout, and shipping costs, as well as the cost of purchased memory products and other component parts. We charge cost of sales for inventory provisions to write down our inventory to the lower of cost or net realizable value or to completely write off obsolete or excess inventory. Most of our inventory provisions relate to the write-off of excess quantities of products, based on our inventory levels and future product purchase commitments compared to assumptions about future demand and market conditions. Once inventory has been written-off or written-down, it creates a new cost basis for the inventory that is not subsequently written-up.

Property and Equipment

Property and equipment are stated at cost. Depreciation of property and equipment is computed using the straight-line method based on the estimated useful lives of the assets, generally three to five years. Once an asset is identified for retirement or disposition, the related cost and accumulated depreciation or amortization are removed, and a gain or loss is recorded. The estimated useful lives of our buildings are up to thirty years. Depreciation expense includes the amortization of assets recorded under capital leases. Leasehold improvements and assets recorded under capital leases are amortized over the shorter of the expected lease term or the estimated useful life of the asset.

Goodwill

Goodwill is subject to our annual impairment test during the fourth quarter of our fiscal year, or earlier if indicators of potential impairment exist. For the purposes of completing our impairment test, we perform either a qualitative or a quantitative analysis on a reporting unit basis.

Qualitative factors include industry and market considerations, overall financial performance, and other relevant events and factors affecting the reporting units.

Our quantitative impairment test considers both the income approach and the market approach to estimate a reporting unit's fair value. The income and market valuation approaches consider a number of factors that include, but are not limited to, prospective financial information, growth rates, residual values, discount rates and comparable multiples from publicly traded companies in our industry and require us to make certain assumptions and estimates regarding industry economic factors and the future profitability of our business. Refer to Note 5 of these Notes to the Consolidated Financial Statements for additional information.

Intangible Assets and Other Long-Lived Assets

Intangible assets primarily represent rights acquired under technology licenses, patents, acquired intellectual property, trademarks and customer relationships. We currently amortize our intangible assets with definitive lives over periods ranging from three to ten years using a method that reflects the pattern in which the economic benefits of the intangible asset are consumed or otherwise used up or, if that pattern cannot be reliably determined, using a straight-line amortization method.

Long-lived assets, such as property and equipment and intangible assets subject to amortization are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset or asset group may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset or asset group to estimated undiscounted future cash flows expected to be generated by the asset, or asset group. If the carrying amount of an asset or asset group exceeds its estimated future cash flows, an impairment charge is recognized for the amount by which the carrying amount of the asset or asset group exceeds the estimated fair value of the asset or asset group. Fair value is determined based on the estimated discounted future cash flows expected to be generated by the asset or asset group. Assets and liabilities to be disposed of would be separately presented in the

Consolidated Balance Sheet and the assets would be reported at the lower of the carrying amount or fair value less costs to sell, and would no longer be depreciated.

Adoption of New and Recently Issued Accounting Pronouncements

Recently Adopted Accounting Pronouncements

The Financial Accounting Standards Board, or FASB, issued an accounting standards update that creates a single source of revenue guidance under U.S. GAAP for all companies, in all industries. We adopted this guidance on January 29, 2018 using the modified retrospective approach. Refer to Note 2 of these Notes to the Consolidated Financial Statements for additional information.

In January 2016, the FASB issued an accounting standards update to amend certain aspects of recognition, measurement, presentation, and disclosure of financial instruments. We are now required to recognize changes in the fair value of our equity investments through net income rather than other comprehensive income. We adopted this guidance in the first quarter of fiscal year 2019 and applied it prospectively. The adoption of this guidance did not have a significant impact on our Consolidated Financial Statements.

Recent Accounting Pronouncements Not Yet Adopted

The FASB issued an accounting standards update regarding the accounting for leases under which we will begin recognizing lease assets and liabilities on the balance sheet for lease terms of more than 12 months. We will adopt this guidance using the optional transition method at the beginning of fiscal year 2020 and will not restate comparative prior periods. Additionally, we will elect the package of practical expedients as permitted by the guidance. We are in the process of finalizing changes to our systems and processes in conjunction with our review of lease agreements and currently expect the adoption of this accounting guidance to result in an increase in lease assets and a corresponding increase in lease liabilities on our Consolidated Balance Sheet of approximately \$500 million.

In June 2016, the FASB issued a new accounting standard to replace the incurred loss impairment methodology under current GAAP with a methodology that reflects expected credit losses and requires consideration of a broader range of reasonable and supportable information to inform credit loss estimates. We will be required to use a forward-looking expected credit loss model for accounts receivable and other financial instruments, including available-for-sale debt securities. The standard will be effective for us beginning in the first quarter of fiscal year 2021, with early adoption permitted. We are currently evaluating the impact of this standard on our Consolidated Financial Statements.

Note 2 - New Revenue Accounting Standard

Method and Impact of Adoption

On January 29, 2018, we adopted the new revenue accounting standard using the modified retrospective method and applied it to contracts that were not completed as of that date. Upon adoption, we recognized the cumulative effect of the new standard as a \$7 million increase to opening retained earnings, net of tax. Comparative information for prior periods has not been adjusted. The impact of the new standard on our consolidated financial statements for fiscal year 2019 was not significant.

Deferred Revenue and Performance Obligations

Deferred revenue is comprised mainly of customer advances and deferrals related to license and development arrangements and PCS related to software licensing. The following table shows the changes in deferred revenue during fiscal year 2019:

	January 27, 2019
	<i>(in millions)</i>
Balance as of January 28, 2018	\$ 68
Adjustment to retained earnings upon adoption of new revenue standard	(5)
Balance as of January 29, 2018	63
Deferred revenue added during the period	344
Revenue recognized during the period	(269)
Balance as of January 27, 2019	<u>\$ 138</u>

Revenue related to remaining performance obligations represents the amount of contracted license and development arrangements and PCS that has not been recognized. As of January 27, 2019, the amount of our remaining performance obligations that has not been recognized as revenue was \$305 million, of which we expect to recognize approximately 50% as revenue over the next twelve months and the remainder thereafter. This amount excludes the value of remaining performance obligations for contracts with an original expected length of one year or less.

Refer to Note 16 of these Notes to the Consolidated Financial Statements for additional information, including disaggregated revenue disclosures.

Note 3 - Stock-Based Compensation

Our stock-based compensation expense is associated with restricted stock units, or RSUs, performance stock units that are based on our corporate financial performance targets, or PSUs, performance stock units that are based on market conditions, or market-based PSUs, and our ESPP.

Our Consolidated Statements of Income include stock-based compensation expense, net of amounts allocated to inventory, as follows:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	<i>(In millions)</i>		
Cost of revenue	\$ 27	\$ 21	\$ 15
Research and development	336	219	134
Sales, general and administrative	194	151	98
Total	<u>\$ 557</u>	<u>\$ 391</u>	<u>\$ 247</u>

Stock-based compensation capitalized in inventories was not significant during fiscal years 2019, 2018, and 2017.

The following is a summary of equity awards granted under our equity incentive plans:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	<i>(In millions, except per share data)</i>		

RSUs, PSUs and Market-based PSUs

Awards granted	4	6	12
Estimated total grant-date fair value	\$ 1,109	\$ 929	\$ 591
Weighted average grant-date fair value (per share)	\$ 258.26	\$ 145.91	\$ 50.57

ESPP

Shares purchased	1	5	4
Weighted average price (per share)	\$ 107.48	\$ 21.24	\$ 18.51
Weighted average grant-date fair value (per share)	\$ 38.51	\$ 7.12	\$ 5.80

Beginning fiscal year 2015, we shifted away from granting stock options and toward granting RSUs, PSUs and market-based PSUs to reflect changing market trends for equity incentives at our peer companies. The number of PSUs that will ultimately vest is contingent on the Company's level of achievement versus the corporate financial performance target established by our Compensation Committee in the beginning of each fiscal year.

Of the total fair value of equity awards, we estimated that the stock-based compensation expense related to the equity awards that are not expected to vest for fiscal year 2019 was \$88 million.

	January 27, 2019	January 28, 2018
	<i>(In millions)</i>	
Aggregate unearned stock-based compensation expense	\$ 1,580	\$ 1,091

Estimated weighted average remaining amortization period *(In years)*

RSUs, PSUs and market-based PSUs	2.2	2.3
ESPP	0.8	0.7

The fair value of shares issued under our ESPP have been estimated with the following assumptions:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	<i>(Using the Black-Scholes model)</i>		

ESPP

Weighted average expected life (in years)	0.1-2.0	0.5-2.0	0.5-2.0
Risk-free interest rate	1.6%-2.8%	0.8%-1.4%	0.5%-0.9%
Volatility	24%-75%	40%-54%	30%-39%
Dividend yield	0.3%-0.4%	0.3%-0.5%	0.7%-1.4%

For ESPP shares, the expected term represents the average term from the first day of the offering period to the purchase date. The risk-free interest rate assumption used to value ESPP shares is based upon observed interest rates on Treasury bills appropriate for the expected term. Our expected stock price volatility assumption for ESPP is estimated using historical volatility. For awards granted, we use the dividend yield at grant date. Our RSU, PSU, and market-based PSU awards are not eligible for cash dividends prior to vesting; therefore, the fair values of RSUs, PSUs, and market-based PSUs are discounted for the dividend yield.

Additionally, for RSU, PSU, and market-based PSU awards, we estimate forfeitures annually and revise the estimates of forfeiture in subsequent periods if actual forfeitures differ from those estimates. Forfeitures are estimated based on historical experience.

Equity Incentive Program

We grant or have granted stock options, RSUs, PSUs, market-based PSUs, and stock purchase rights under the following equity incentive plans.

Amended and Restated 2007 Equity Incentive Plan

In 2007, our shareholders approved the NVIDIA Corporation 2007 Equity Incentive Plan, as most recently amended and restated, the 2007 Plan.

The 2007 Plan authorizes the issuance of incentive stock options, non-statutory stock options, restricted stock, restricted stock units, stock appreciation rights, performance stock awards, performance cash awards, and other stock-based awards to employees, directors and consultants. Only our employees may receive incentive stock options. Up to 230 million shares of our common stock may be issued pursuant to stock awards granted under the 2007 Plan. Currently, we grant RSUs, PSUs and market-based PSUs under the 2007 Plan, under which, as of January 27, 2019, there were 35 million shares available for future issuance.

Stock options previously granted to employees, subject to certain exceptions, vest over a four-year period, subject to continued service, with 25% vesting on the anniversary of the hire date in the case of new hires or the anniversary of the date of grant in the case of grants to existing employees and 6.25% vesting quarterly thereafter. These stock options generally expire ten years from the date of grant.

Subject to certain exceptions, RSUs and PSUs granted to employees vest over a four-year period, subject to continued service, with 25% vesting on a pre-determined date that is close to the anniversary of the date of grant and (i) for grants made prior to May 18, 2016, 12.5% vesting semi-annually thereafter, and (ii) for grants made on or after May 18, 2016, 6.25% vesting quarterly thereafter. Market-based PSUs vest 100% on approximately the three-year anniversary of the date of grant. However, the number of shares subject to both PSUs and market-based PSUs that are eligible to vest is generally determined by the Compensation Committee based on achievement of pre-determined criteria.

Unless terminated sooner, the 2007 Plan is scheduled to terminate on March 21, 2022. Our Board may suspend or terminate the 2007 Plan at any time. No awards may be granted under the 2007 Plan while the 2007 Plan is suspended or after it is terminated. The Board may also amend the 2007 Plan at any time. However, if legal, regulatory or listing requirements require shareholder approval, the amendment will not go into effect until the shareholders have approved the amendment.

Amended and Restated 2012 Employee Stock Purchase Plan

In 2012, our shareholders approved the 2012 Employee Stock Purchase Plan, as most recently amended and restated, the 2012 Plan, as the successor to the 1998 Employee Stock Purchase Plan.

Up to 89 million shares of our common stock may be issued pursuant to purchases under the 2012 Plan. As of January 27, 2019, we had issued 29 million shares and reserved 60 million shares for future issuance under the 2012 Plan.

The 2012 Plan is intended to qualify as an "employee stock purchase plan" under Section 423 of the Internal Revenue Code. Under the current offerings adopted pursuant to the 2012 Plan, each offering period is approximately 24 months, which is generally divided into four purchase periods of six months.

Employees are eligible to participate if they are employed by us or an affiliate of us as designated by the Board. Employees who participate in an offering may have up to 10% of their earnings withheld up to certain limitations and applied on specified dates determined by the Board to the purchase of shares of common stock. The Board may increase this percentage at its discretion, up to 15%. The price of common stock purchased under our 2012 Plan will be equal to 85% of the lower of the fair market value of the common stock on the commencement date of each offering period and the fair market value on each purchase date within the offering. Employees may end their participation in the 2012 Plan at any time during the offering period, and participation ends automatically on termination of employment with us. In each case, the employee's contributions are refunded.

The following is a summary of our equity award transactions under our equity incentive plans:

	RSUs, PSUs and Market-based PSUs Outstanding	
	Number of Shares	Weighted Average Grant-Date Fair Value
	(In millions, except years and per share data)	
Balances, January 28, 2018	22	\$ 66.72
Granted (1)(2)	4	\$ 258.26
Vested restricted stock	(10)	\$ 52.56
Canceled and forfeited	—	\$ —
Balances, January 27, 2019	16	\$ 129.92
Vested and expected to vest after January 27, 2019	13	\$ 129.44

(1) Includes PSUs that will be issued and eligible to vest based on the corporate financial performance level achieved for fiscal year 2019.

(2) Includes market-based PSUs that will be issued and eligible to vest if the maximum target for total shareholder return, or TSR, over the 3-year measurement period is achieved. Depending on the ranking of our TSR compared to the respective TSRs of the companies comprising the Standard & Poor's 500 Index during that period, the market-based PSUs issued could be up to 45 thousand shares.

As of January 27, 2019 and January 28, 2018, there were 35 million and 16 million shares, respectively, of common stock reserved for future issuance under our equity incentive plans.

The total intrinsic value of options exercised was \$180 million, \$318 million, and \$246 million for fiscal years 2019, 2018, and 2017, respectively. Upon exercise of an option, we issue new shares of stock.

Note 4 - Net Income Per Share

The following is a reconciliation of the denominator of the basic and diluted net income per share computations for the periods presented:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	(In millions, except per share data)		
Numerator:			
Net income	\$ 4,141	\$ 3,047	\$ 1,666
Denominator:			
Basic weighted average shares	608	599	541
Dilutive impact of outstanding securities:			
Equity awards	17	24	26
1.00% Convertible Senior Notes	—	5	44
Warrants issued with the 1.00% Convertible Senior Notes	—	4	38
Diluted weighted average shares	625	632	649
Net income per share:			
Basic (1)	\$ 6.81	\$ 5.09	\$ 3.08
Diluted (2)	\$ 6.63	\$ 4.82	\$ 2.57
Equity awards excluded from diluted net income per share because their effect would have been anti-dilutive	5	4	8

(1) Calculated as net income divided by basic weighted average shares.

(2) Calculated as net income divided by diluted weighted average shares.

The 1.00% Convertible Senior Notes Due 2018, or the Convertible Notes, were included in the calculation of diluted net income per share. The Convertible Notes had a dilutive impact on net income per share if our average stock price for the reporting period exceeded the adjusted conversion price of \$20.02 per share. The warrants associated with our Convertible

Notes, or the Warrants, outstanding were also included in the calculation of diluted net income per share. As of January 27, 2019, there were no Convertible Notes or Warrants outstanding.

Refer to Note 11 of these Notes to the Consolidated Financial Statements for additional discussion regarding the Convertible Notes, Note Hedges, and Warrants.

Note 5 - Goodwill

The carrying amount of goodwill was \$618 million, and the amount of goodwill allocated to our GPU and Tegra Processor reporting units was \$210 million and \$408 million, respectively, as of both January 27, 2019 and January 28, 2018. There were no changes to the carrying amount of goodwill during fiscal years 2019 and 2018. During the fourth quarters of fiscal years 2019, 2018, and 2017, we completed our annual impairment tests and concluded that goodwill was not impaired in any of these years.

Note 6 - Amortizable Intangible Assets

The components of our amortizable intangible assets are as follows:

	January 27, 2019			January 28, 2018		
	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount	Gross Carrying Amount	Accumulated Amortization	Net Carrying Amount
	(In millions)			(In millions)		
Acquisition-related intangible assets	\$ 195	\$ (188)	\$ 7	\$ 195	\$ (180)	\$ 15
Patents and licensed technology	491	(453)	38	469	(432)	37
Total intangible assets.....	<u>\$ 686</u>	<u>\$ (641)</u>	<u>\$ 45</u>	<u>\$ 664</u>	<u>\$ (612)</u>	<u>\$ 52</u>

The increase in gross carrying amount of intangible assets is due to purchases of licensed technology during fiscal year 2019. Amortization expense associated with intangible assets for fiscal years 2019, 2018, and 2017 was \$29 million, \$55 million, and \$68 million, respectively. Future amortization expense related to the net carrying amount of intangible assets as of January 27, 2019 is estimated to be \$21 million in fiscal year 2020, \$12 million in fiscal year 2021, \$5 million in fiscal year 2022, and \$5 million in fiscal year 2023, and \$2 million in fiscal year 2024.

Note 7 - Marketable Securities

Our cash equivalents and marketable securities are classified as “available-for-sale” debt securities.

The following is a summary of cash equivalents and marketable securities as of January 27, 2019 and January 28, 2018:

	January 27, 2019						
	Amortized Cost	Unrealized Gain	Unrealized Loss	Estimated Fair Value	Reported as		
					Cash Equivalents	Marketable Securities	
	(In millions)						
Corporate debt securities	\$ 2,626	\$ —	\$ (6)	\$ 2,620	\$ 25	\$ 2,595	
Debt securities of United States government agencies	2,284	—	(4)	2,280	—	2,280	
Debt securities issued by the United States Treasury	1,493	—	(1)	1,492	176	1,316	
Money market funds	483	—	—	483	483	—	
Foreign government bonds.....	209	—	—	209	—	209	
Asset-backed securities	152	—	(1)	151	—	151	
Mortgage-backed securities issued by United States government-sponsored enterprises	88	1	—	89	—	89	
Total	\$ 7,335	\$ 1	\$ (12)	\$ 7,324	\$ 684	\$ 6,640	

	January 28, 2018						
	Amortized Cost	Unrealized Gain	Unrealized Loss	Estimated Fair Value	Reported as		
					Cash Equivalents	Marketable Securities	
	(In millions)						
Money market funds	\$ 3,789	\$ —	\$ —	\$ 3,789	\$ 3,789	\$ —	
Corporate debt securities	1,304	—	(9)	1,295	—	1,295	
Debt securities of United States government agencies	822	—	(7)	815	—	815	
Debt securities issued by the United States Treasury	577	—	(4)	573	—	573	
Asset-backed securities	254	—	(2)	252	—	252	
Mortgage backed securities issued by United States government-sponsored enterprises	128	2	—	130	—	130	
Foreign government bonds	42	—	(1)	41	—	41	
Total	\$ 6,916	\$ 2	\$ (23)	\$ 6,895	\$ 3,789	\$ 3,106	

The following table provides the breakdown of unrealized losses as of January 27, 2019, aggregated by investment category and length of time that individual securities have been in a continuous loss position:

	Less than 12 Months		12 Months or Greater		Total	
	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses	Estimated Fair Value	Gross Unrealized Losses
	(In millions)					
Debt securities issued by United States government agencies	\$ 1,674	\$ (1)	\$ 401	\$ (3)	\$ 2,075	\$ (4)
Corporate debt securities.....	915	(3)	649	(3)	1,564	(6)
Debt securities issued by the United States Treasury	1,015	—	161	(1)	1,176	(1)
Asset-backed securities	—	—	151	(1)	151	(1)
Total	\$ 3,604	\$ (4)	\$ 1,362	\$ (8)	\$ 4,966	\$ (12)

The gross unrealized losses are related to fixed income securities, temporary in nature, and driven primarily by changes in interest rates. We have the intent and ability to hold our investments until maturity. For fiscal years 2019, 2018, and 2017, there were no other-than-temporary impairment losses and net realized gains were not significant.

The amortized cost and estimated fair value of cash equivalents and marketable securities as of January 27, 2019 and January 28, 2018 are shown below by contractual maturity.

	January 27, 2019		January 28, 2018	
	Amortized Cost	Estimated Fair Value	Amortized Cost	Estimated Fair Value
	(In millions)			
Less than one year	\$ 5,042	\$ 5,034	\$ 5,381	\$ 5,375
Due in 1 - 5 years	2,271	2,268	1,500	1,485
Mortgage-backed securities issued by United States government-sponsored enterprises not due at a single maturity date	22	22	35	35
Total	\$ 7,335	\$ 7,324	\$ 6,916	\$ 6,895

Note 8 - Fair Value of Financial Assets and Liabilities

The fair values of our financial assets and liabilities are determined using quoted market prices of identical assets or quoted market prices of similar assets from active markets. We review fair value hierarchy classification on a quarterly basis. There were no significant transfers between Levels 1 and 2 financial assets and liabilities for fiscal year 2019. Level 3 financial assets and liabilities are based on unobservable inputs to the valuation methodology and include our own data about assumptions market participants would use in pricing the asset or liability based on the best information available under the circumstances.

	Pricing Category	Fair Value at	
		January 27, 2019	January 28, 2018
		(In millions)	
Assets			
Cash equivalents and marketable securities:			
Corporate debt securities	Level 2	\$ 2,620	\$ 1,295
Debt securities of United States government agencies	Level 2	\$ 2,280	\$ 815
Debt securities issued by the United States Treasury	Level 2	\$ 1,492	\$ 573
Money market funds	Level 1	\$ 483	\$ 3,789
Foreign government bonds	Level 2	\$ 209	\$ 41
Asset-backed securities	Level 2	\$ 151	\$ 252
Mortgage-backed securities issued by United States government-sponsored enterprises	Level 2	\$ 89	\$ 130
Liabilities			
Current liability:			
1.00% Convertible Senior Notes (1)	Level 2	\$ —	\$ 189
Other noncurrent liabilities:			
2.20% Notes Due 2021 (1)	Level 2	\$ 978	\$ 982
3.20% Notes Due 2026 (1)	Level 2	\$ 961	\$ 986

(1) These liabilities are carried on our Consolidated Balance Sheets at their original issuance value, net of unamortized debt discount and issuance costs, and are not marked to fair value each period. Refer to Note 11 of these Notes to the Consolidated Financial Statements for additional information.

Note 9 - Balance Sheet Components

Certain balance sheet components are as follows:

	January 27, 2019	January 28, 2018
<i>(In millions)</i>		
Inventories:		
Raw materials	\$ 613	\$ 227
Work in-process	238	192
Finished goods	724	377
Total inventories	<u>\$ 1,575</u>	<u>\$ 796</u>

	January 27, 2019	January 28, 2018	Estimated Useful Life
	<i>(In millions)</i>		<i>(In years)</i>
Property and Equipment:			
Land	\$ 218	\$ 218	(A)
Building	339	348	25-30
Test equipment.....	516	462	3-5
Computer equipment	522	285	3-5
Leasehold improvements	263	198	(B)
Software and licenses	109	88	3-5
Office furniture and equipment	69	79	5
Capital leases	28	28	(B)
Construction in process	107	31	(C)
Total property and equipment, gross	2,171	1,737	
Accumulated depreciation and amortization	(767)	(740)	
Total property and equipment, net.....	\$ 1,404	\$ 997	

(A) Land is a non-depreciable asset.

(B) Leasehold improvements and capital leases are amortized based on the lesser of either the asset's estimated useful life or the remaining expected lease term.

(C) Construction in process represents assets that are not available for their intended use as of the balance sheet date.

Depreciation expense for fiscal years 2019, 2018, and 2017 was \$233 million, \$144 million, and \$118 million, respectively.

Accumulated amortization of leasehold improvements and capital leases was \$189 million and \$178 million as of January 27, 2019 and January 28, 2018, respectively.

	January 27, 2019	January 28, 2018
	(In millions)	
Accrued and Other Current Liabilities:		
Customer program accruals	\$ 302	\$ 181
Accrued payroll and related expenses	186	172
Deferred revenue (1)	92	53
Taxes payable	91	33
Accrued legal settlement costs	24	—
Coupon interest on debt obligations	20	20
Warranty accrual (2)	18	15
Professional service fees	14	15
Accrued royalties	10	17
Other	61	36
Total accrued and other current liabilities	\$ 818	\$ 542

(1) Deferred revenue primarily includes customer advances and deferrals related to license and development arrangements and PCS.

(2) Refer to Note 12 of these Notes to the Consolidated Financial Statements for a discussion regarding warranties.

	January 27, 2019	January 28, 2018
	<i>(In millions)</i>	
Other Long-Term Liabilities:		
Income tax payable (1)	\$ 513	\$ 559
Deferred revenue (2)	46	15
Deferred rent	21	9
Employee benefits liability	20	12
Deferred income tax liability	19	18
Other	14	19
Total other long-term liabilities	\$ 633	\$ 632

- (1) As of January 27, 2019, represents the long-term portion of the one-time transition tax payable of \$350 million, as well as unrecognized tax benefits of \$142 million and related interest and penalties of \$21 million.
- (2) Deferred revenue primarily includes deferrals related to license and development arrangements and PCS.

Note 10 - Derivative Financial Instruments

We enter into foreign currency forward contracts to mitigate the impact of foreign currency exchange rate movements on our operating expenses. We designate these contracts as cash flow hedges and assess the effectiveness of the hedge relationships on a spot to spot basis. Gains or losses on the contracts are recorded in accumulated other comprehensive income or loss and reclassified to operating expense when the related operating expenses are recognized in earnings or ineffectiveness should occur. The fair value of the contracts was not significant as of January 27, 2019 and January 28, 2018.

We also enter into foreign currency forward contracts to mitigate the impact of foreign currency movements on monetary assets and liabilities that are denominated in currencies other than U.S. dollar. These forward contracts were not designated for hedge accounting treatment. Therefore, the change in fair value of these contracts is recorded in other income or expense and offsets the change in fair value of the hedged foreign currency denominated monetary assets and liabilities, which is also recorded in other income or expense.

The table below presents the notional value of our foreign currency forward contracts outstanding as of January 27, 2019 and January 28, 2018:

	January 27, 2019	January 28, 2018
	<i>(In millions)</i>	
Designated as cash flow hedges	\$ 408	\$ 104
Not designated for hedge accounting	\$ 241	\$ 94

As of January 27, 2019, all designated foreign currency forward contracts mature within eighteen months. The expected realized gains and losses deferred into accumulated other comprehensive income (loss) related to foreign currency forward contracts within the next twelve months was not significant.

During fiscal years 2019 and 2018, the impact of derivative financial instruments designated for hedge accounting treatment on other comprehensive income or loss was not significant and all such instruments were determined to be highly effective. Therefore, there were no gains or losses associated with ineffectiveness.

Note 11 - Debt

Long-Term Debt

2.20% Notes Due 2021 and 3.20% Notes Due 2026

In fiscal year 2017, we issued \$1.00 billion of the 2.20% Notes Due 2021, and \$1.00 billion of the 3.20% Notes Due 2026, or collectively, the Notes. Interest on the Notes is payable on March 16 and September 16 of each year, beginning on March 16, 2017. Upon 30 days' notice to holders of the Notes, we may redeem the Notes for cash prior to maturity, at redemption

prices that include accrued and unpaid interest, if any, and a make-whole premium. However, no make-whole premium will be paid for redemptions of the Notes Due 2021 on or after August 16, 2021, or for redemptions of the Notes Due 2026 on or after June 16, 2026. The net proceeds from the Notes were \$1.98 billion, after deducting debt discount and issuance costs.

The Notes are our unsecured senior obligations and rank equally in right of payment with all existing and future unsecured and unsubordinated indebtedness. The Notes are structurally subordinated to the liabilities of our subsidiaries and are effectively subordinated to any secured indebtedness to the extent of the value of the assets securing such indebtedness. All existing and future liabilities of our subsidiaries will be effectively senior to the Notes.

The carrying value of the Notes and the associated interest rates were as follows:

	Expected Remaining Term (years)	Effective Interest Rate	January 27, 2019	January 28, 2018
<i>(In millions)</i>				
2.20% Notes Due 2021	2.6	2.38%	\$ 1,000	\$ 1,000
3.20% Notes Due 2026	7.6	3.31%	1,000	1,000
Unamortized debt discount and issuance costs			(12)	(15)
Net carrying amount			<u>\$ 1,988</u>	<u>\$ 1,985</u>

Convertible Debt

1.00% Convertible Senior Notes Due 2018

In fiscal year 2014, we issued \$1.50 billion of Convertible Notes. During fiscal year 2019, we paid cash to settle an aggregate of \$16 million in principal amount of the Convertible Notes and issued 714 thousand shares of our common stock for the excess conversion value. The related loss on early conversions was not significant. As of January 27, 2019, there were no Convertible Notes outstanding.

Note Hedges

Concurrently with the issuance of the Convertible Notes, we entered into the Note Hedges. Through January 27, 2019, we had received 57 million shares of our common stock from the exercise of a portion of the Note Hedges related to the settlement of \$1.50 billion in principal amount of the Convertible Notes. As of January 27, 2019, there were no Note Hedges outstanding.

Revolving Credit Facility

We have a Credit Agreement under which we may borrow up to \$575 million for general corporate purposes and can obtain revolving loan commitments up to \$425 million. As of January 27, 2019, we had not borrowed any amounts under this agreement.

Commercial Paper

We have a \$575 million commercial paper program to support general corporate purposes. As of January 27, 2019, we had not issued any commercial paper.

Note 12 - Commitments and Contingencies

Inventory Purchase Obligations

As of January 27, 2019, we had outstanding inventory purchase obligations totaling \$912 million.

Capital Purchase Obligations

As of January 27, 2019, we had outstanding capital purchase obligations totaling \$258 million.

Lease Obligations

Our headquarters complex is located in Santa Clara, California and includes ten buildings that are leased properties. Future minimum lease payments related to headquarters operating leases total \$326 million over the remaining terms of the leases, including predetermined rent escalations, and are included in the future minimum lease payment schedule below.

Additionally, we have other domestic and international office facilities, including datacenter space, under operating leases expiring through fiscal year 2035.

Future minimum lease payments under our non-cancelable operating leases as of January 27, 2019, are as follows:

	Future Minimum Lease Obligations
	<i>(In millions)</i>
Fiscal Year:	
2020	\$ 100
2021	97
2022	90
2023	77
2024	54
2025 and thereafter	265
Total	<u>\$ 683</u>

Rent expense for fiscal years 2019, 2018, and 2017 was \$80 million, \$54 million, and \$46 million, respectively.

Accrual for Product Warranty Liabilities

The estimated amount of product returns and warranty liabilities was \$18 million and \$15 million as of January 27, 2019 and January 28, 2018, respectively.

In connection with certain agreements that we have entered in the past, we have provided indemnities to cover the indemnified party for matters such as tax, product, and employee liabilities. We have included intellectual property indemnification provisions in our technology related agreements with third parties. Maximum potential future payments cannot be estimated because many of these agreements do not have a maximum stated liability. We have not recorded any liability in our Consolidated Financial Statements for such indemnifications.

Litigation

Polaris Innovations Limited

On May 16, 2016, Polaris Innovations Limited, or Polaris, a non-practicing entity and wholly-owned subsidiary of Quarterhill Inc. (formerly WiLAN Inc.), filed a complaint against NVIDIA for patent infringement in the United States District Court for the Western District of Texas. Polaris alleges that NVIDIA has infringed and is continuing to infringe six U.S. patents relating to the control of dynamic random-access memory, or DRAM. The complaint seeks unspecified monetary damages, enhanced damages, interest, fees, expenses, and costs against NVIDIA. On September 14, 2016, NVIDIA answered the Polaris Complaint and asserted various defenses including non-infringement and invalidity of the six Polaris patents.

On December 5, 2016, the Texas Court granted NVIDIA's motion to transfer and ordered the case transferred to the Northern District of California.

Between December 7, 2016 and July 25, 2017, NVIDIA filed multiple petitions for inter partes review, or IPR, at the United States Patent and Trademark Office, or USPTO, challenging the validity of each of the patents asserted by Polaris in the U.S. litigation. The USPTO instituted IPRs for four U.S. patents and declined to institute IPRs on two U.S. patents. On June 19, 2018, the USPTO issued a Final Written Decision on one IPR, finding claims 1-23 and 28 unpatentable but that claims 24-27 were not proved unpatentable. On November 20, 2018, the USPTO issued Final Written Decisions on two IPRs, finding claims 1, 4, 8-12, 16, 18, 43, 45, and 48-51 unpatentable but that claims 2-3, 5, 14, 17, 19-23, 26-31, and 44 were not proved unpatentable. On December 4, 2018, the USPTO issued a Final Written Decision on one IPR, finding all claims unpatentable. On December 19, 2018, the USPTO issued a Final Written Decision on one IPR, finding claims 1-14 unpatentable.

On June 15, 2017, the California Court granted NVIDIA's motion to stay the district court litigation pending resolution of the petitions for IPR. The California Court has not set a trial date.

On December 30, 2016, Polaris filed a complaint against NVIDIA for patent infringement in the Regional Court of Düsseldorf, Germany. Polaris alleges that NVIDIA has infringed and is continuing to infringe three patents relating to control of DRAM. On July 14, 2017, NVIDIA filed defenses to the infringement allegations including non-infringement with respect to each of the three asserted patents. On September 3, 2018, NVIDIA filed a rejoinder with additional noninfringement arguments. On December 4, 2018, NVIDIA filed a further rejoinder with additional noninfringement, nullity, and FRAND arguments.

An oral hearing is scheduled for February 21, 2019.

Between March 31, 2017 and June 12, 2017, NVIDIA filed nullity actions with the German Patent Court challenging the validity of each of the patents asserted by Polaris in the German litigation.

ZiiLabs 1 Patents Lawsuit

On October 2, 2017, ZiiLabs Inc., Ltd., or ZiiLabs, a non-practicing entity, filed a complaint in the United States District Court for the District of Delaware alleging that NVIDIA has infringed and is continuing to infringe four U.S. patents relating to GPUs, or the ZiiLabs 1 Patents. ZiiLabs is a Bermuda corporation and a wholly-owned subsidiary of Creative Technology Asia Limited, a Hong Kong company which is itself is a wholly-owned subsidiary of Creative Technology Ltd., a publicly traded Singapore company. The complaint seeks unspecified monetary damages, enhanced damages, interest, costs, and fees against NVIDIA and an injunction against further direct or indirect infringement of the ZiiLabs 1 Patents. On November 27, 2017, NVIDIA answered the ZiiLabs complaint and asserted various defenses including non-infringement and invalidity of the ZiiLabs 1 Patents.

On January 10, 2018, ZiiLabs filed a first amended complaint asserting infringement of a fifth U.S. patent.

On February 22, 2018, the Delaware Court stayed the ZiiLabs 1 case pending the resolution of the U.S. International Trade Commission, or USITC, investigation over the ZiiLabs 2 patents.

On February 1, 2019, NVIDIA entered into an immaterial agreement in which it receives a license to the ZiiLabs patents and a dismissal of the ZiiLabs 1 and 2 Patent Lawsuits. The ZiiLabs 1 and 2 district court cases were dismissed pursuant to a stipulation of dismissal filed on February 8, 2019. The Administrative Law Judge issued an Initial Determination on February 12, 2019, granting the motion to terminate the USITC investigation addressing the ZiiLabs 2 patents.

ZiiLabs 2 Patents Lawsuits

On December 27, 2017, ZiiLabs filed a second complaint in the United States District Court for the District of Delaware alleging that NVIDIA has infringed four additional U.S. patents, or the ZiiLabs 2 Patents. The second complaint also seeks unspecified monetary damages, enhanced damages, interest, costs, and fees against NVIDIA and an injunction against further direct or indirect infringement of the ZiiLabs 2 Patents.

On February 22, 2018, the Delaware Court stayed the district court action on the ZiiLabs 2 patents pending the resolution of the USITC Investigation over the ZiiLabs 2 patents.

On December 29, 2017, ZiiLabs filed a request with the USITC to commence an Investigation pursuant to Section 337 of the Tariff Act of 1930 relating to the unlawful importation of certain graphics processors and products containing the same. ZiiLabs alleges that the unlawful importation results from the infringement of the ZiiLabs 2 Patents by products from respondents NVIDIA, ASUSTeK Computer Inc., ASUS Computer International, EVGA Corporation, Gigabyte Technology Co., Ltd., G.B.T. Inc., Micro-Star International Co., Ltd., MSI Computer Corp., Nintendo Co., Ltd., Nintendo of America Inc., PNY Technologies Inc., Zotac International (MCO) Ltd., and Zotac USA Inc.

On February 28, 2018, NVIDIA and the other respondents answered the USITC complaint and asserted various defenses including non-infringement and invalidity of the four asserted ZiiLabs 2 patents.

On May 10, 2018, the Administrative Law Judge then presiding over the investigation issued an Initial Determination terminating the investigation with respect to one of the patents. On July 17, 2018, the USITC affirmed this decision on modified grounds.

On October 18, 2018, the Administrative Law Judge currently presiding over the investigation issued an order construing certain claims of the three remaining patents in the investigation.

The hearing in the investigation is currently scheduled to begin on April 8, 2019. The target date for completion of the investigation is September 9, 2019.

On February 1, 2019, NVIDIA entered into an immaterial agreement in which it receives a license to the ZiiLabs patents and a dismissal of the ZiiLabs 1 and 2 Patent Lawsuits. The ZiiLabs 1 and 2 district court cases were dismissed pursuant to a stipulation of dismissal filed on February 8, 2019. The Administrative Law Judge issued an Initial Determination on February 12, 2019, granting the motion to terminate the USITC investigation addressing the ZiiLabs 2 patents.

Securities Class Action and Derivative Lawsuits

On December 21, 2018, a purported securities class action lawsuit was filed in the United States District Court for the Northern District of California, captioned Iron Workers Joint Funds v. Nvidia Corporation, et al. (Case No. 18-cv-7669), naming as defendants NVIDIA and certain of NVIDIA's officers. The complaint asserts that the defendants violated Section 10(b) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, and SEC Rule 10b-5, by making materially false or misleading statements related to channel inventory and the impact of cryptocurrency mining on GPU demand between August 10, 2017 and November 15, 2018. The plaintiff also alleges that the NVIDIA officers who they named as defendants violated Section 20(a) of the Exchange Act. The plaintiff seeks class certification, an award of unspecified compensatory damages, an award of equitable/injunctive or other further relief as the Court may deem just and proper. On December 28, 2018, a substantially similar purported securities class action was commenced in the Northern District of California, captioned Oto v. Nvidia Corporation, et al. (Case No. 18-cv-07783), naming the same defendants, and seeking substantially similar relief. The two cases have been related and are before the same judge. A stipulation to consolidate the Iron Workers and Oto actions is pending before the Court. On February 19, 2019, a number of shareholders filed motions to consolidate the two cases and to be appointed lead plaintiff and for their respective counsel to be appointed lead counsel.

On January 18, 2019, a shareholder, purporting to act on the behalf of NVIDIA, filed a derivative lawsuit in the Northern District of California, captioned Han v. Huang, et al. (Case No. 19-cv-00341), seeking to assert claims on behalf of NVIDIA against the members of NVIDIA's board of directors and certain officers. The lawsuit asserts claims for breach of fiduciary duty, unjust enrichment, waste of corporate assets, and violations of Sections 14(a), 10(b), and 20(a) of the Exchange Act based on the dissemination of allegedly false and misleading statements related to channel inventory and the impact of cryptocurrency mining on GPU demand. The plaintiff is seeking unspecified damages and other relief, including reforms and improvements to NVIDIA's corporate governance and internal procedures. On February 12, 2019, a substantially similar derivative lawsuit was filed in the Northern District of California captioned Yang v. Huang, et. al. (Case No. 19-cv-00766), naming the same named defendants, and seeking the same relief. On February 19, 2019, a third substantially similar derivative lawsuit was filed in the Northern District of California captioned The Booth Family Trust v. Huang, et. al. (Case No. 3:19-cv-00876), naming the same named defendants, and seeking substantially the same relief.

It is possible that additional suits will be filed, or allegations received from shareholders, with respect to these same or other matters, naming us and/or our officers and directors as defendants.

Accounting for Loss Contingencies

We are engaged in legal actions not described above arising in the ordinary course of business and, while there can be no assurance of favorable outcomes, we believe that the ultimate outcome of these actions will not have a material adverse effect on our operating results, liquidity or financial position. As of January 27, 2019, with the exception of immaterial amounts, we have not recorded any accrual for contingent liabilities associated with the legal proceedings described above based on our belief that liabilities, while possible, are not probable. Further, except as specifically described above, any possible loss or range of loss in these matters cannot be reasonably estimated at this time.

Note 13 - Income Taxes

The income tax expense (benefit) applicable to income before income taxes consists of the following:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	<i>(In millions)</i>		
Current income taxes:			
Federal	\$ 1	\$ 464	\$ 7
State	—	1	1
Foreign	69	43	34
Total current	70	508	42
Deferred taxes:			
Federal	(315)	(376)	199
State	—	—	—
Foreign	—	17	(2)
Total deferred	(315)	(359)	197
Income tax expense (benefit)	<u>\$ (245)</u>	<u>\$ 149</u>	<u>\$ 239</u>

Income before income tax consists of the following:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	<i>(In millions)</i>		
Domestic (1)	\$ 1,843	\$ 1,600	\$ 600
Foreign	2,053	1,596	1,305
Income before income tax	<u>\$ 3,896</u>	<u>\$ 3,196</u>	<u>\$ 1,905</u>

(1) The increase in domestic income is primarily due to jurisdictional allocation of stock-based compensation charges.

The income tax expense (benefit) differs from the amount computed by applying the U.S. federal statutory rate of 21%, 33.9%, and 35% for fiscal years 2019, 2018, and 2017, respectively, to income before income taxes as follows:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
	<i>(In millions)</i>		
Tax expense computed at federal statutory rate	\$ 818	\$ 1,084	\$ 667
Expense (benefit) resulting from:			
State income taxes, net of federal tax effect	23	10	4
Foreign tax rate differential	(412)	(545)	(315)
Stock-based compensation	(191)	(181)	(70)
Tax Cuts and Jobs Act of 2017	(368)	(133)	—
U.S. federal R&D tax credit	(141)	(87)	(52)
Other	26	1	5
Income tax expense (benefit)	<u>\$ (245)</u>	<u>\$ 149</u>	<u>\$ 239</u>

The tax effect of temporary differences that gives rise to significant portions of the deferred tax assets and liabilities are presented below:

	January 27, 2019	January 28, 2018
	<i>(In millions)</i>	
Deferred tax assets:		
Net operating loss carryforwards	\$ 70	\$ 67
Accruals and reserves, not currently deductible for tax purposes	41	24
Property, equipment and intangible assets	2	32
Research and other tax credit carryforwards	626	579
Stock-based compensation	25	24
GILTI deferred tax assets	376	—
Gross deferred tax assets	1,140	726
Less valuation allowance	(562)	(469)
Total deferred tax assets	578	257
Deferred tax liabilities:		
Acquired intangibles	(2)	(4)
Unremitted earnings of foreign subsidiaries	(35)	(26)
Gross deferred tax liabilities	(37)	(30)
Net deferred tax asset (1)	\$ 541	\$ 227

(1) Net deferred tax asset includes long-term deferred tax assets of \$560 million and \$245 million and long-term deferred tax liabilities of \$19 million and \$18 million for fiscal years 2019 and 2018, respectively. Long-term deferred tax assets are included in Other assets and long-term deferred tax liabilities are included in Other long-term liabilities on our Consolidated Balance Sheets.

We recognized an income tax benefit of \$245 million for fiscal year 2019, and income tax expense of \$149 million and \$239 million for fiscal years 2018, and 2017, respectively. Our annual effective tax rate was (6.3)%, 4.7%, and 12.5% for fiscal years 2019, 2018, and 2017, respectively.

In December 2017, the TCJA was enacted into law. The TCJA significantly changed U.S. tax law, including a reduction of the U.S. federal corporate income tax rate from 35% to 21%, a requirement for companies to pay a one-time transition tax on the earnings of certain foreign subsidiaries that were previously tax deferred and the creation of new taxes (global intangible low-taxed income, or GILTI) on certain foreign-source earnings. As a fiscal year-end taxpayer, certain provisions of the TCJA began to impact us in the fourth quarter of fiscal year 2018, while other provisions impacted us beginning in fiscal year 2019.

In fiscal year 2018 and the first nine months of fiscal year 2019, we recorded provisional amounts for certain enactment-date effects of the TCJA by applying the SEC guidance in SAB 118 because we had not yet completed our accounting for these effects. As of January 27, 2019, we completed our accounting for all of the enactment-date income tax effects of the TCJA and recognized a reduction of \$368 million to the provisional amount recorded at January 28, 2018 as a component of income tax expense (benefit). This adjustment primarily relates to the effects of electing to account for GILTI in deferred taxes, as described below. Our final tax benefit from the TCJA was \$501 million.

The one-time transition tax is based on the post-1986 earnings and profits, or E&P, of our foreign subsidiaries. We had previously accrued deferred taxes on a portion of these same earnings. We recorded a provisional one-time transition tax liability of \$971 million at January 28, 2018. Upon further analysis of the TCJA and Notices and regulations issued by the US Department of the Treasury and Internal Revenue Service, we finalized our calculations of the transition tax liability during fiscal year 2019. For fiscal year 2019, we increased our transition tax provisional amount by \$33 million.

As a result of the reduction of the corporate income tax rate to 21%, companies were required to remeasure their deferred tax assets and liabilities as of the date of enactment. As a result, at January 28, 2018 we had recorded a provisional income tax expense of \$43 million on the write-down of our deferred tax balance. Upon further analysis of certain aspects of the TJCA, including immediate expensing of qualified capital expenditures and refinement of our calculations, we reduced our provisional tax expense amount by \$20 million.

The TCJA subjects a U.S. corporation to tax on its GILTI. Under U.S. GAAP, we can make an accounting policy election to either treat taxes due on the GILTI as a current period expense or factor such amounts into our measurement of deferred taxes. Because we were still evaluating the GILTI provisions as of January 28, 2018, we recorded no GILTI-related deferred balances. After further evaluation, we elected to account for GILTI deferred taxes. In fiscal year 2019, we recorded additional deferred tax assets as a net \$370 million income tax benefit related to GILTI in deferred taxes.

The decrease in the effective tax rate in fiscal year 2019 as compared to fiscal years 2018 and 2017 was primarily due to a decrease in the U.S. statutory tax rate from 33.9% to 21%, the finalization of the enactment-date income tax effects of the TCJA, higher U.S. federal research tax credits and excess tax benefits related to stock-based compensation in fiscal year 2019.

The decrease in the effective tax rate in fiscal year 2018 as compared to fiscal year 2017 was primarily due to the provisional impact of the tax law changes and recognition of excess tax benefits related to stock-based compensation.

Our effective tax rate for fiscal year 2019 was lower than the U.S. federal statutory rate of 21% due primarily to income earned in jurisdictions, including British Virgin Islands, Hong Kong, China, Taiwan and United Kingdom, where the tax rate was lower than the U.S. federal statutory tax rates, the finalization of the enactment-date income tax effects of the TCJA, favorable recognition of the U.S. federal research tax credits, and excess tax benefits related to stock-based compensation.

Our effective tax rate for fiscal years 2018 and 2017 was lower than the blended U.S. federal statutory rate of 33.9% for fiscal year 2018 and 35% for fiscal year 2017 due primarily to income earned in jurisdictions, including British Virgin Islands, Hong Kong, China, Taiwan and United Kingdom, where the tax rate was lower than the U.S. federal statutory tax rates, favorable recognition of U.S. federal research tax credits, the provisional impact of the tax law changes in 2018, and excess tax benefits related to stock-based compensation.

As of January 27, 2019 and January 28, 2018, we had a valuation allowance of \$562 million and \$469 million, respectively, related to state and certain foreign deferred tax assets that management determined not likely to be realized due, in part, to projections of future taxable income. To the extent realization of the deferred tax assets becomes more-likely-than-not, we would recognize such deferred tax asset as an income tax benefit during the period.

As of January 27, 2019, we had federal, state and foreign net operating loss carryforwards of \$72 million, \$291 million and \$290 million, respectively. The federal and state carryforwards will expire beginning in fiscal year 2023 and 2020, respectively. The foreign net operating loss carryforwards of \$290 million may be carried forward indefinitely. As of January 27, 2019, we had federal research tax credit carryforwards of \$347 million that will begin to expire in fiscal year 2037. We have state research tax credit carryforwards of \$718 million, of which \$687 million is attributable to the State of California and may be carried over indefinitely, and \$31 million is attributable to various other states and will expire beginning in fiscal year 2020. Our tax attributes, net operating loss and tax credit carryforwards, remain subject to audit and may be adjusted for changes or modification in tax laws, other authoritative interpretations thereof, or other facts and circumstances. Utilization of federal, state, and foreign net operating losses and tax credit carryforwards may also be subject to limitations due to ownership changes and other limitations provided by the Internal Revenue Code and similar state and foreign tax provisions. If any such limitations apply, the federal, states, or foreign net operating loss and tax credit carryforwards, as applicable, may expire or be denied before utilization.

As of January 27, 2019, we had \$477 million of gross unrecognized tax benefits, of which \$432 million would affect our effective tax rate if recognized. However, approximately \$82 million of the unrecognized tax benefits were related to state income tax positions taken, that, if recognized, would be in the form of a carryforward deferred tax asset that would likely attract a full valuation allowance. The \$432 million of unrecognized tax benefits as of January 27, 2019 consisted of \$142 million recorded in non-current income taxes payable and \$290 million reflected as a reduction to the related deferred tax assets.

A reconciliation of gross unrecognized tax benefits is as follows:

	January 27, 2019	January 28, 2018	January 29, 2017
	(In millions)		
Balance at beginning of period	\$ 447	\$ 224	\$ 230
Increases in tax positions for prior years	52	7	3
Decreases in tax positions for prior years	(141)	(1)	—
Increases in tax positions for current year	129	222	46
Settlements	—	—	(48)
Lapse in statute of limitations	(10)	(5)	(7)
Balance at end of period	<u>\$ 477</u>	<u>\$ 447</u>	<u>\$ 224</u>

We classify an unrecognized tax benefit as a current liability, or amount refundable, to the extent that we anticipate payment or receipt of cash for income taxes within one year. The amount is classified as a long-term liability, or reduction of long-term deferred tax assets or amount refundable if we anticipate payment or receipt of cash for income taxes during a period beyond a year.

Our policy is to include interest and penalties related to unrecognized tax benefits as a component of income tax expense. As of January 27, 2019, January 28, 2018, and January 29, 2017, we had accrued \$21 million, \$15 million, and \$13 million, respectively, for the payment of interest and penalties related to unrecognized tax benefits, which is not included as a component of our unrecognized tax benefits. As of January 27, 2019, unrecognized tax benefits of \$142 million and the related interest and penalties of \$21 million are included in non-current income taxes payable.

While we believe that we have adequately provided for all tax positions, amounts asserted by tax authorities could be greater or less than our accrued position. Accordingly, our provisions on federal, state and foreign tax-related matters to be recorded in the future may change as revised estimates are made or the underlying matters are settled or otherwise resolved. As of January 27, 2019, we do not believe that our estimates, as otherwise provided for, on such tax positions will significantly increase or decrease within the next twelve months.

We are subject to taxation by a number of taxing authorities both in the United States and throughout the world. As of January 27, 2019, the significant tax jurisdictions that may be subject to examination include the United States, Hong Kong, Taiwan, China, United Kingdom, Germany, and India for fiscal years 2003 through 2018. As of January 27, 2019, the significant tax jurisdictions for which we are currently under examination include India, Taiwan, China and UK for fiscal years 2003 through 2018.

Note 14 - Shareholders' Equity

Capital Return Program

Beginning August 2004, our Board of Directors authorized us to repurchase our stock.

During fiscal year 2019, we repurchased a total of 9 million shares for \$1.58 billion and also paid \$371 million in cash dividends to our shareholders.

Through January 27, 2019, we have repurchased an aggregate of 260 million shares under our share repurchase program for a total cost of \$7.08 billion. All shares delivered from these repurchases have been placed into treasury stock. In November 2018, our board of directors authorized an additional \$7.00 billion under our share repurchase program. As of January 27, 2019, we were authorized, subject to certain specifications, to repurchase additional shares of our common stock up to \$7.24 billion through December 2022.

Preferred Stock

As of January 27, 2019 and January 28, 2018, there were no shares of preferred stock outstanding.

Common Stock

We are authorized to issue up to 2.00 billion shares of our common stock at \$0.001 per share par value.

Note 15 - Employee Retirement Plans

We have a 401(k) retirement plan covering substantially all of our U.S. employees. Under the plan, participating employees may defer up to 80% of their pre-tax earnings, subject to the Internal Revenue Service annual contribution limits and we match a portion of the employee contributions. Our contribution expense for fiscal years 2019, 2018, and 2017 was \$39 million, \$23 million, and \$12 million, respectively. We also have defined contribution retirement plans outside of the United States to which we contributed \$31 million, \$25 million, and \$23 million for fiscal years 2019, 2018, and 2017, respectively.

Note 16 - Segment Information

Our Chief Executive Officer, who is considered to be our chief operating decision maker, or CODM, reviews financial information presented on an operating segment basis for purposes of making operating decisions and assessing financial performance. Our operating segments are equivalent to our reportable segments.

We report our business in two primary reportable segments - the GPU business and the Tegra Processor business - based on a single underlying graphics architecture.

Our GPU product brands are aimed at specialized markets including GeForce for gamers; Quadro for designers; Tesla and DGX for AI data scientists and big data researchers; and GRID for cloud-based visual computing users. Our Tegra brand integrates an entire computer onto a single chip, and incorporates GPUs and multi-core CPUs to drive supercomputing for autonomous robots, drones, and cars, as well as for game consoles and mobile gaming and entertainment devices.

Under the single unifying architecture for our GPU and Tegra Processors, we leverage our visual computing expertise by charging the operating expenses of certain core engineering functions to the GPU business, while charging the Tegra Processor business for the incremental cost of the teams working directly for that business. In instances where the operating expenses of certain functions benefit both reportable segments, our CODM assigns 100% of those expenses to the reportable segment that benefits the most.

The "All Other" category presented below represents the revenue and expenses that our CODM does not assign to either the GPU business or the Tegra Processor business for purposes of making operating decisions or assessing financial performance. The revenue includes primarily patent licensing revenue and the expenses include stock-based compensation expense, corporate infrastructure and support costs, acquisition-related costs, legal settlement costs, contributions, restructuring and other charges, product warranty charge, and other non-recurring charges and benefits that our CODM deems to be enterprise in nature.

Our CODM does not review any information regarding total assets on a reportable segment basis. Reportable segments do not record intersegment revenue, and, accordingly, there is none to be reported. The accounting policies for segment reporting are the same as for our consolidated financial statements. The table below presents details of our reportable segments and the "All Other" category.

	GPU	Tegra Processor	All Other	Consolidated
	(In millions)			
Year Ended January 27, 2019:				
Revenue	\$ 10,175	\$ 1,541	\$ —	\$ 11,716
Depreciation and amortization expense	\$ 197	\$ 47	\$ 18	\$ 262
Operating income (loss)	\$ 4,443	\$ 241	\$ (880)	\$ 3,804
Year Ended January 28, 2018:				
Revenue	\$ 8,137	\$ 1,534	\$ 43	\$ 9,714
Depreciation and amortization expense	\$ 123	\$ 37	\$ 39	\$ 199
Operating income (loss)	\$ 3,507	\$ 303	\$ (600)	\$ 3,210
Year Ended January 29, 2017:				
Revenue	\$ 5,822	\$ 824	\$ 264	\$ 6,910
Depreciation and amortization expense	\$ 116	\$ 29	\$ 42	\$ 187
Operating income (loss)	\$ 2,180	\$ (9)	\$ (237)	\$ 1,934

Year Ended		
January 27, 2019	January 28, 2018	January 29, 2017
<i>(In millions)</i>		

Reconciling items included in "All Other" category:

Unallocated revenue	\$ —	\$ 43	\$ 264
Stock-based compensation expense	(557)	(391)	(247)
Unallocated cost of revenue and operating expenses	(277)	(237)	(215)
Legal settlement costs	(44)	—	(16)
Acquisition-related and other costs	(2)	(15)	(23)
Total	<u>\$ (880)</u>	<u>\$ (600)</u>	<u>\$ (237)</u>

Revenue by geographic region is allocated to individual countries based on the location to which the products are initially billed even if our customers' revenue is attributable to end customers that are located in a different location. The following table summarizes information pertaining to our revenue from customers based on the invoicing address by geographic regions:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
Revenue:	(In millions)		
Taiwan	\$ 3,360	\$ 2,991	\$ 2,546
China (including Hong Kong)	2,801	1,896	1,305
Other Asia Pacific	2,368	2,066	1,010
United States	1,506	1,274	904
Europe	914	768	659
Other countries	767	719	486
Total revenue	\$ 11,716	\$ 9,714	\$ 6,910

The following table summarizes information pertaining to our revenue by each of the specialized markets we serve:

	Year Ended		
	January 27, 2019	January 28, 2018	January 29, 2017
Revenue:	<i>(In millions)</i>		
Gaming	\$ 6,246	\$ 5,513	\$ 4,060
Professional Visualization	1,130	934	835
Datacenter	2,932	1,932	830
Automotive	641	558	487
OEM & IP	767	777	698
Total revenue	<u>\$ 11,716</u>	<u>\$ 9,714</u>	<u>\$ 6,910</u>

The following table presents summarized information for long-lived assets by geographic region. Long-lived assets consist of property and equipment and deposits and other assets, and exclude goodwill and intangible assets.

	January 27, 2019	January 28, 2018
Long-lived assets:	<i>(In millions)</i>	
United States	\$ 1,266	\$ 928
Taiwan	137	58
India	44	40
China (including Hong Kong)	38	33
Europe	26	11
Other Asia Pacific	1	1
Total long-lived assets	<u>\$ 1,512</u>	<u>\$ 1,071</u>

No customer represented 10% or more of total revenue for fiscal years 2019 and 2018. In fiscal year 2017, we had one customer that represented 12% of our total revenue. The revenue was attributable to the GPU business.

Accounts receivable from significant customers, those representing 10% or more of total accounts receivable, aggregated approximately 19% of our accounts receivable balance from one customer as of January 27, 2019, and approximately 28% of our accounts receivable balance from two customers as of January 28, 2018.

Note 17 - Quarterly Summary (Unaudited)

The following table sets forth our unaudited consolidated financial results, for the last eight fiscal quarters:

	Fiscal Year 2019 Quarters Ended			
	January 27, 2019	October 28, 2018	July 29, 2018	April 29, 2018
<i>(In millions, except per share data)</i>				
Statements of Income Data:				
Revenue	\$ 2,205	\$ 3,181	\$ 3,123	\$ 3,207
Cost of revenue	\$ 998	\$ 1,260	\$ 1,148	\$ 1,139
Gross profit	\$ 1,207	\$ 1,921	\$ 1,975	\$ 2,068
Net income (1)	\$ 567	\$ 1,230	\$ 1,101	\$ 1,244
Net income per share (1):				
Basic	\$ 0.93	\$ 2.02	\$ 1.81	\$ 2.05
Diluted	\$ 0.92	\$ 1.97	\$ 1.76	\$ 1.98

- (1) In the third and fourth quarters of fiscal year 2019, we recorded U.S. tax reform benefits of \$138 million and \$230 million, respectively, associated with the completion of our accounting for the enactment-date income tax effects of the TCJA. Refer to Note 13 of these Notes to the Consolidated Financial Statements for a discussion regarding the U.S. tax reform.

	Fiscal Year 2018 Quarters Ended			
	January 28, 2018	October 28, 2017	July 29, 2017	April 29, 2017
<i>(In millions, except per share data)</i>				
Statements of Income Data:				
Revenue	\$ 2,911	\$ 2,636	\$ 2,230	\$ 1,937
Cost of revenue	\$ 1,110	\$ 1,067	\$ 928	\$ 787
Gross profit	\$ 1,801	\$ 1,569	\$ 1,302	\$ 1,150
Net income (1)	\$ 1,118	\$ 838	\$ 583	\$ 507
Net income per share (1):				
Basic	\$ 1.84	\$ 1.39	\$ 0.98	\$ 0.86
Diluted	\$ 1.78	\$ 1.33	\$ 0.92	\$ 0.79

- (1) In the fourth quarter of fiscal year 2018, we recorded a U.S. tax reform provisional net tax benefit of \$133 million associated with the one-time transition tax on our historical foreign earnings and the adjustment of deferred tax balances to the lower corporate tax rate. Refer to Note 13 of these Notes to the Consolidated Financial Statements for a discussion regarding the U.S. tax reform.

NVIDIA CORPORATION AND SUBSIDIARIES
SCHEDULE II – VALUATION AND QUALIFYING ACCOUNTS

Description	Balance at Beginning of Period	Additions	Deductions	Balance at End of Period
		(In millions)		
Fiscal year 2019				
Allowance for doubtful accounts	\$ 4	\$ — (1)	\$ (2) (1)	\$ 2
Sales return allowance	\$ 9	\$ 21 (2)	\$ (22) (4)	\$ 8
Deferred tax valuation allowance	\$ 469	\$ 93 (3)	\$ —	\$ 562
Fiscal year 2018				
Allowance for doubtful accounts	\$ 3	\$ 1 (1)	\$ — (1)	\$ 4
Sales return allowance	\$ 10	\$ 15 (2)	\$ (16) (4)	\$ 9
Deferred tax valuation allowance	\$ 353	\$ 116 (3)	\$ —	\$ 469
Fiscal year 2017				
Allowance for doubtful accounts	\$ 2	\$ 1 (1)	\$ — (1)	\$ 3
Sales return allowance	\$ 9	\$ 9 (2)	\$ (8) (4)	\$ 10
Deferred tax valuation allowance	\$ 272	\$ 81 (3)	\$ —	\$ 353

- (1) Additions represent allowance for doubtful accounts charged to expense and deductions represent amounts recorded as reduction to expense upon reassessment of allowance for doubtful accounts at period end.
- (2) Represents allowance for sales returns estimated at the time revenue is recognized primarily based on historical return rates and is charged as a reduction to revenue.
- (3) Represents change in valuation allowance primarily related to state and certain foreign deferred tax assets that management has determined not likely to be realized due, in part, to projections of future taxable income of the respective jurisdictions. Refer to Note 13 of the Notes to the Consolidated Financial Statements in Part IV, Item 15 of this Annual Report on Form 10-K for additional information.
- (4) Represents sales returns.

EXHIBIT INDEX

Exhibit No.	Exhibit Description	Incorporated by Reference			
		Schedule/ Form	File Number	Exhibit	Filing Date
3.1	Amended and Restated Certificate of Incorporation	S-8	333-74905	4.1	3/23/1999
3.2	Certificate of Amendment of Amended and Restated Certificate of Incorporation	10-Q	0-23985	3.1	8/21/2008
3.3	Certificate of Amendment of Amended and Restated Certificate of Incorporation	8-K	0-23985	3.1	5/24/2011
3.4	Bylaws of NVIDIA Corporation, Amended and Restated as of November 29, 2016	8-K	0-23985	3.1	12/1/2016
4.1	Reference is made to Exhibits 3.1, 3.2, 3.3 and 3.4				
4.2	Specimen Stock Certificate	S-1/A	333-47495	4.2	4/24/1998
4.3	Indenture (including the form of Notes) dated December 2, 2013 between NVIDIA Corporation and Wells Fargo Bank, National Association	8-K	0-23985	4.1	12/2/2013
4.4	Form of 1.00% Convertible Senior Note due 2018	8-K	0-23985	Exhibit A to Exhibit 4.1	12/2/2013
4.5	Indenture, dated as of September 16, 2016, by and between the Company and Wells Fargo Bank, National Association, as Trustee	8-K	0-23985	4.1	9/16/2016
4.6	Officers' Certificate, dated as of September 16, 2016	8-K	0-23985	4.2	9/16/2016
4.7	Form of 2021 Note	8-K	0-23985	Annex A to Exhibit 4.2	9/16/2016
4.8	Form of 2026 Note	8-K	0-23985	Annex B to Exhibit 4.2	9/16/2016
10.1	Form of Indemnity Agreement between NVIDIA Corporation and each of its directors and officers	8-K	0-23985	10.1	3/7/2006
10.2+	Amended and Restated 2007 Equity Incentive Plan	8-K	0-23985	10.1	5/21/2018
10.3+	2007 Equity Incentive Plan - Non-Statutory Stock Option (Annual Grant - Board Service (2011))	10-Q	0-23985	10.41	5/27/2011
10.4+	2007 Equity Incentive Plan - Non-Statutory Stock Option (Initial Grant - Board Service (2011))	8-K	0-23985	10.1	12/14/2011
10.5+	Amended and Restated 2007 Equity Incentive Plan - Non-Employee Director Stock Option Grant (2012 Annual Board Retainer)	10-Q	0-23985	10.4	5/23/2012
10.6+	2007 Equity Incentive Plan - Non Statutory Stock Option	8-K	0-23985	10.2	9/13/2010
10.7+	2007 Equity Incentive Plan - Incentive Stock Option	8-K	0-23985	10.21	9/13/2010
10.8+	Amended and Restated 2007 Equity Incentive Plan - Non Statutory Stock Option	10-Q	0-23985	10.1	8/22/2012
10.9+	Amended and Restated 2007 Equity Incentive Plan - Incentive Stock Option	10-Q	0-23985	10.2	8/22/2012

10.10+	Amended and Restated 2007 Equity Incentive Plan - Restricted Stock Unit Grant Notice and Restricted Stock Unit Purchase Agreement	10-Q	0-23985	10.3	8/22/2012
10.11+	Amended and Restated 2007 Equity Incentive Plan - Non-Employee Director Restricted Stock Unit (with deferral option)	10-Q	0-23985	10.3	5/23/2012
10.12+	Amended and Restated 2007 Equity Incentive Plan - Non Statutory Stock Option (Initial Grant - Board Service)	8-K	0-23985	10.1	7/23/2013
10.13+	Amended and Restated 2007 Equity Incentive Plan - Non-Employee Director Deferred Restricted Stock Unit Grant Notice and Deferred Restricted Stock Unit Agreement (2015)	10-K	0-23985	10.25	3/12/2015
10.14+	Amended and Restated 2007 Equity Incentive Plan - Non-Employee Director Deferred Restricted Stock Unit Grant Notice and Deferred Restricted Stock Unit Agreement (2016)	10-K	0-23985	10.26	3/12/2015
10.15+	Amended and Restated 2007 Equity Incentive Plan - Non-Employee Director Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement (2016)	10-K	0-23985	10.27	3/12/2015
10.16+	Amended and Restated 2007 Equity Incentive Plan - Non-Employee Director Restricted Stock Unit (Initial Grant - with deferral options)	10-Q	0-23985	10.1	5/20/2015
10.17+	Amended and Restated 2007 Equity Incentive Plan - Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement & Performance-Based Restricted Stock Unit Grant Notice and Performance-Based Restricted Stock Unit Agreement (2015)	10-Q	0-23985	10.2	5/20/2015
10.18+	Amended and Restated 2007 Equity Incentive Plan - Restricted Stock Unit Grant Notice and Restricted Stock Unit Agreement & Performance-Based Restricted Stock Unit Grant Notice and Performance-Based Restricted Stock Unit Agreement (2018)	10-Q	0-23985	10.2	5/22/2018
10.19+*	Amended and Restated 2007 Equity Incentive Plan - Global Restricted Stock Unit Grant Notice and Global Restricted Stock Unit Agreement (2019)				
10.20+	Amended and Restated 2012 Employee Stock Purchase Plan	10-Q	0-23985	10.2	5/21/2018
10.21+	Fiscal Year 2018 Variable Compensation Plan	8-K	0-23985	10.1	3/13/2017
10.22+	Fiscal Year 2019 Variable Compensation Plan	8-K	0-23985	10.1	3/13/2018
10.23+	Offer Letter between NVIDIA Corporation and Colette Kress, dated September 13, 2013	8-K	0-23985	10.1	9/16/2013
10.24+	Offer Letter between NVIDIA Corporation and Tim Teter, dated December 16, 2016	8-K	0-23985	10.1	1/19/2017
10.25	Base Convertible Note Hedge Transaction Confirmation	8-K	0-23985	99.1	12/2/2013
10.26	Additional Convertible Note Hedge Transaction Confirmation	8-K	0-23985	99.3	12/2/2013

10.27	Credit Agreement, dated as of October 7, 2016 by and among NVIDIA Corporation, Wells Fargo Bank, National Association, as administrative agent, and the lenders party thereto	8-K	0-23985	1.1	10/13/2016
10.28	Form of Commercial Paper Dealer Agreement between NVIDIA Corporation, as Issuer, and the Dealer party thereto	8-K	0-23985	10.1	12/15/2017
21.1*	List of Registrant's Subsidiaries				
23.1*	Consent of PricewaterhouseCoopers LLP				
24.1*	Power of Attorney (included in signature page)				
31.1*	Certification of Chief Executive Officer as required by Rule 13a-14(a) of the Securities Exchange Act of 1934				
31.2*	Certification of Chief Financial Officer as required by Rule 13a-14(a) of the Securities Exchange Act of 1934				
32.1#*	Certification of Chief Executive Officer as required by Rule 13a-14(b) of the Securities Exchange Act of 1934				
32.2#*	Certification of Chief Financial Officer as required by Rule 13a-14(b) of the Securities Exchange Act of 1934				
101.INS*	XBRL Instance Document				
101.SCH*	XBRL Taxonomy Extension Schema Document				
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase Document				
101.DEF*	XBRL Taxonomy Extension Definition Linkbase Document				
101.LAB*	XBRL Taxonomy Extension Labels Linkbase Document				
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase Document				

* Filed herewith.

+ Management contract or compensatory plan or arrangement.

In accordance with Item 601(b)(32)(ii) of Regulation S-K and SEC Release Nos. 33-8238 and 34-47986, Final Rule: Management's Reports on Internal Control Over Financial Reporting and Certification of Disclosure in Exchange Act Periodic Reports, the certifications furnished in Exhibits 32.1 and 32.2 hereto are deemed to accompany this Annual Report on Form 10-K and will not be deemed "filed" for purpose of Section 18 of the Exchange Act. Such certifications will not be deemed to be incorporated by reference into any filing under the Securities Act or the Exchange Act, except to the extent that the registrant specifically incorporates it by reference.

Copies of above exhibits not contained herein are available to any shareholder upon written request to:
Investor Relations: NVIDIA Corporation, 2788 San Tomas Expressway, Santa Clara, CA 95051

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on February 21, 2019.

NVIDIA Corporation

By: /s/ Jen-Hsun Huang

Jen-Hsun Huang

President and Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Jen-Hsun Huang and Colette M. Kress, and each or any one of them, his true and lawful attorney-in-fact and agent, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign any and all amendments to this report, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-facts and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their or his substitutes or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ JEN-HSUN HUANG</u> Jen-Hsun Huang	President, Chief Executive Officer and Director (Principal Executive Officer)	February 21, 2019
<u>/s/ COLETTE M. KRESS</u> Colette M. Kress	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 21, 2019
<u>/s/ MICHAEL J. BYRON</u> Michael J. Byron	Vice President and Chief Accounting Officer (Principal Accounting Officer)	February 21, 2019
<u>Robert Burgess</u>	Director	February 21, 2019
<u>/s/ TENCH COXE</u> Tench Cox	Director	February 21, 2019
<u>/s/ PERSIS DRELL</u> Persis Drell	Director	February 21, 2019
<u>/s/ JAMES C. GAITHER</u> James C. Gaither	Director	February 21, 2019
<u>/s/ DAWN HUDSON</u> Dawn Hudson	Director	February 21, 2019
<u>/s/ HARVEY C. JONES</u> Harvey C. Jones	Director	February 21, 2019
<u>/s/ MICHAEL MCCAFFERY</u> Michael McCaffery	Director	February 21, 2019
<u>/s/ MARK L. PERRY</u> Mark L. Perry	Director	February 21, 2019
<u>/s/ A. BROOKE SEAWELL</u> A. Brooke Seawell	Director	February 21, 2019
<u>Mark Stevens</u>	Director	February 21, 2019

Exhibit R

INFORMATION RESOURCES

WHILST EVERY ENDEAVOR IS MADE TO ENSURE THAT INFORMATION PROVIDED IS UPDATED AND CORRECT. THE AUTHORITY DISCLAIMS ANY LIABILITY FOR ANY DAMAGE OR LOSS THAT MAY BE CAUSED AS A RESULT OF ANY ERROR OR OMISSION.

**Corporate Compliance and Financial Profile of NVIDIA SINGAPORE PTE LTD
(200003831M)**

Date :17/05/2020

The Following Are The Brief Particulars of :

Registration No.	:	200003831M
Company Name.	:	NVIDIA SINGAPORE PTE LTD
Former Name if any	:	
Incorporation Date.	:	04/05/2000
Company Type	:	PRIVATE COMPANY LIMITED BY SHARES
Status	:	Live Company
Status Date	:	04/05/2000

Principal Activities

Activities (I)	:	WHOLESALE OF ELECTRONIC COMPONENTS(46522)
Description	:	SALE OF GRAPHIC PROCESSORS, AND MEDIA & COMMUNICATION DEVICES
Activities (II)	:	
Description	:	

Capital

Issued Share Capital (AMOUNT)	Number of Shares *	Currency	Share Type
2000	2	SINGAPORE, DOLLARS	ORDINARY

* Number of Shares includes number of Treasury Shares

Paid-Up Capital (AMOUNT)	Number of Shares	Currency	Share Type
2000		SINGAPORE, DOLLARS	ORDINARY

COMPANY HAS THE FOLLOWING ORDINARY SHARES HELD AS TREASURY SHARES

Number Of Shares	Currency
------------------	----------

Registered Office Address : 112 ROBINSON ROAD
#05-01
ROBINSON 112
SINGAPORE (068902)

INFORMATION RESOURCES

WHILST EVERY ENDEAVOR IS MADE TO ENSURE THAT INFORMATION PROVIDED IS UPDATED AND CORRECT. THE AUTHORITY DISCLAIMS ANY LIABILITY FOR ANY DAMAGE OR LOSS THAT MAY BE CAUSED AS A RESULT OF ANY ERROR OR OMISSION.

**Corporate Compliance and Financial Profile of NVIDIA SINGAPORE PTE LTD
(200003831M)**

Date :17/05/2020

Date of Address	01/12/2012
Date of Last AGM	16/07/2019
Date of Last AR	24/07/2019
FYE As At Date of Last AR	27/01/2019

Financial Information

Financial Period	29/01/2018 to 27/01/2019	30/01/2017 to 28/01/2018	01/02/2016 to 29/01/2017
Extracted From: #	XBRL FS for period ended 27 JAN 2019	XBRL FS for period ended 27 JAN 2019	XBRL FS for period ended 28 JAN 2018

Are there any changes to figures
reported by Company compared to
prior year FS?

-

-

-

Company / Group Account	Company	Company	Company
Currency	USD	USD	USD

Balance Sheet

Total Assets	1,986,302,000.00	1,479,248,000.00	1,409,295,000.00
Total Current Assets	1,985,437,000.00	1,478,318,000.00	1,407,644,000.00
Total Liabilities	1,938,317,000.00	1,435,731,000.00	1,369,270,000.00
Total Current Liabilities	1,938,317,000.00	1,435,731,000.00	1,369,270,000.00
Retained Earnings (Accumulated Loss)	31,814,000.00	31,396,000.00	29,599,000.00

Profit and Loss

Revenue	9,727,059,000.00	8,064,722,000.00	5,712,400,000.00
Profit(Loss) before tax from continuing operations	1,062,000.00	2,587,000.00	3,002,000.00
Profit(Loss) after tax from continuing operations	418,000.00	1,797,000.00	2,459,000.00
Profit(Loss) after tax from discontinued operations	*	*	*
EBIT	1,062,000.00	2,587,000.00	3,002,000.00

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**Corporate Compliance and Financial Profile of NVIDIA SINGAPORE PTE LTD
(200003831M)**

Date :17/05/2020

Cashflow Statement

Net cashflow from (used in) operating activities	-2,540,000.00	-92,301,000.00	-122,747,000.00
Net cashflow from (used in) investing activities	-270,000.00	402,000.00	-1,055,000.00
Net cashflow from (used in) financing activities	0.00	0.00	0.00

Financial Ratios

Current Ratio (Times)	1.02	1.03	1.03
Operating Profit Margin (%)	0.01	0.03	0.05
Net Profit Margin (%)	0.00	0.02	0.04
Return on Assets (%)	0.05	0.17	0.21
Return on Equity (%)	0.87	4.13	6.14
Total Liabilities to Equity (Times)	40.39	32.99	34.21
Total Asset Turnover (Times)	4.90	5.45	4.05
Interest Cover Ratio (Times)	*	*	*

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Corporate Compliance and Financial Profile of NVIDIA SINGAPORE PTE LTD (200003831M)

Date :17/05/2020

Non-Financial Information

Extracted From: #	XBRL FS for period ended 27 JAN 2019	XBRL FS for period ended 28 JAN 2018	XBRL FS for period ended 29 JAN 2017
Audit Opinion in Auditors' Report:	Unqualified opinion	Unqualified opinion	Unqualified opinion
Reasons for the modified Audit Opinion:	*	*	*
Whether there is any material uncertainty relating to going concern, reported in Auditors' Report:	*	*	*
Audit Firm:	PRICEWATERHOUS ECOOPERS LLP	PRICEWATERHOUS ECOOPERS LLP	PRICEWATERHOUS ECOOPERS LLP
In the Statement by Directors, are the Directors of the opinion that the FS are drawn up to exhibit a true and fair view?	Yes	Yes	Yes

Notes

* : Information is not available. Non-availability may be due to any of the following reasons:

- Non-filing of XBRL FS (e.g. filing of PDF FS only or FS not required to be filed with ACRA); or
- Assets and liabilities presented in order of liquidity, instead of current/non-current classification; or
- Exempted from audit requirements;
- Company falling within the qualification criteria to file a reduced set of elements in XBRL;

: Financial and Non-Financial information may be extracted from different years of XBRL FS.

For detailed definition of the audit opinion, financial ratio formulae and explanation, visit:

<https://www.acra.gov.sg/how-to-guides/buying-information/corporate-compliance-and-financial-profile>

Audit Firms

NAME

PRICEWATERHOUSECOOPERS LLP

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**Corporate Compliance and Financial Profile of NVIDIA SINGAPORE PTE LTD
(200003831M)**

Date :17/05/2020

Charges				
Charge No.	Date Registered	Currency	Amount Secured	Chargee(s)

Officers/Authorised Representative(s)

Name	ID	Nationality	Source of Address	Date of Appointment
Address		Position Held		
REBECCA PETERS		AMERICAN	ACRA	31/05/2016
, CAPITOLA, CA 95010, USA		Director		
MICHAEL JOHN BYRON		AMERICAN	ACRA	31/10/2013
DUBLIN, CA 94568, UNITED STATES OF AMERICA		Director		
KAREN THERESA BURNS		AMERICAN	ACRA	27/04/2009
, PALO ALTO CALIFORNIA 94301, U.S.A.		Director		
LEE KAY BENG		MALAYSIAN	ACRA	18/07/2002
4 HAIG LANE SINGAPORE (438808)		Director		
CHAN CHOW PHENG		SINGAPORE CITIZEN	ACRA	13/06/2011
112 ROBINSON ROAD #05-01 ROBINSON 112 SINGAPORE (068902)		Secretary		
TEO CHIN KEE		SINGAPORE CITIZEN	ACRA	05/01/2005
112 ROBINSON ROAD #05-01 ROBINSON 112 SINGAPORE (068902)		Secretary		

Shareholder(s)

Name	ID	Nationality/Place of incorporation/Origin	Source of Address	Address Changed
Address				
1 NVIDIA INTERNATIONAL INC.	T00UF0363E	CAYMAN ISLANDS	ACRA	

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**Corporate Compliance and Financial Profile of NVIDIA SINGAPORE PTE LTD
(200003831M)**

Date :17/05/2020

Shareholder(s)

Name	ID	Nationality/Place of incorporation/Origin	Source of Address	Address Changed
Address				

P.O. BOX 448, ELGIN COURT, ELGIN
AVENUE,
GEORGE TOWN, GRAND CAYMAN,
KY1-1106, CAYMAN ISLANDS

Ordinary(Number)	Currency
2	SINGAPORE, DOLLARS

Abbreviation

UL - Local Entity not registered with ACRA

UF - Foreign Entity not registered with ACRA

AR - Annual Return

AGM - Annual General Meeting

FS - Financial Statements

FYE - Financial Year End

OSCARS - One Stop Change of Address Reporting Service by Immigration & Checkpoint Authority.

Note :

- null

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SINGAPORE

RECEIPT NO. : ACRA200517188135

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Exhibit S



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Click below to download a PDF version of the User Guide for these NVIDIA branded graphics cards sold at NVIDIA.com and Best Buy.

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[GeForce RTX 2080 Ti User Guide](#)

[GeForce RTX 2080 User Guide](#)

[GeForce RTX 2070 User Guide](#)

[GeForce RTX 2060 User Guide](#)

[TITAN Xp User Guide](#)

[TITAN X User Guide](#)

[GTX 1080 Ti User Guide](#)

[GTX 1080 User Guide](#)

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[GTX 1060 User Guide](#)

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Deep Learning & AI	Jetson Quadro	Developer Forums	NVIDIA Blog
Design & Visualization	SHIELD TV Tesla	Open Source Portal	Email Signup
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High Performance Computing		GPU Tech Conference	
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Gaming & Entertainment			
NGC			

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Best Buy Concord Pike



4807 Concord Pike
Wilmington, DE 19803


[Get Directions](#)

Store Hours

Curbside pickup & scheduled consultations only.

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Mon	May. 25	10:00 AM - 7:00 PM
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Wed	May. 27	10:00 AM - 7:00 PM
Thu	May. 28	10:00 AM - 7:00 PM
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Best Buy Dover



1165 N Dupont Hwy
Dover, DE 19901


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1165 N Dupont Hwy

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Best Buy Christiana



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Newark, DE 19702


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Tue	May. 26	10:00 AM - 7:00 PM
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Store Locator

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2700 Fashion Center Blvd

Newark, DE 19702

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(302) 369-7015 (tel:3023697015)

Send an email (<https://web.archive.org/web/20160905014328/mailto:S-001480-Leaders@bestbuy.com>)

About Best Buy Christiana

At Best Buy Christiana, we specialize in helping you find the best technology to fit the way you live. Together, we can transform your living space with the latest HDTVs, computers, smart home technology, and gaming consoles like Xbox One, PlayStation 4 and Wii U. We can walk you through updating your appliances with cutting-edge refrigerators, ovens, washers and dryers. We'll also show you how to make the most of your active lifestyle with our huge selection of smartphones, tablets and wearable technology. At Best Buy Christiana, we'll keep your devices running smoothly with the full range of expert services from Geek Squad®. We're here to help, so visit us at 2700 Fashion Center Blvd in Newark, DE to find the perfect new camera, laptop, Blu-ray player, smart lighting or activity tracker today.

About Geek Squad Christiana

No one stands behind you like Geek Squad. The Geek Squad Agents at Best Buy Christiana are ready to help. More than just a computer store, we've got the tools, knowledge and experience to turn questions into answers and issues into fixes. Whether you're in need of cell phone repair or you're wondering "Where is there reliable appliance repair near me?" visit us at 2700 Fashion Center Blvd to see how we can help and learn more about our services including appliance repair, tablet and

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5 Sep 2016 - 5 Jul 2017

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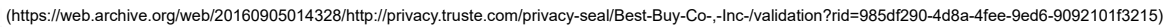
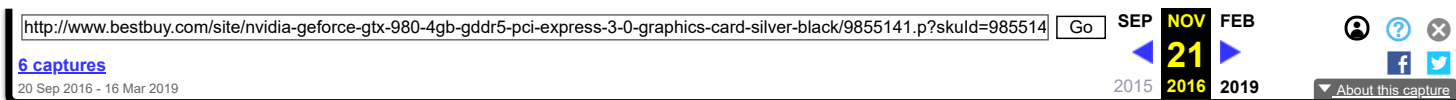


Exhibit W



NVIDIA - GeForce GTX 980 4GB GDDR5 PCI Express 3.0 Graphics Card - Silver/Black

Model: 9001G4012500000 **SKU:** 9855141

4.8 (145)

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Bring gameplay to life with this **NVIDIA GeForce GTX 980 graphics card**, which features a wide range of NVIDIA technologies, including NVIDIA G-Sync and Dynamic Super Resolution, for lush visuals. NVIDIA ShadowPlay allows you to preserve gaming moments.

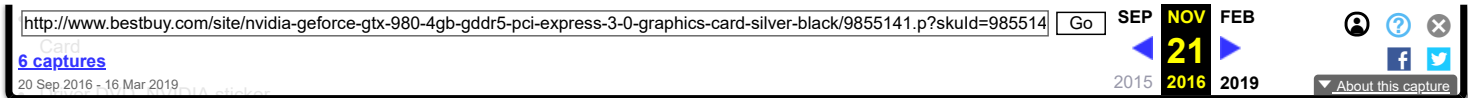


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Overview

What's Included

Product Features



- Owner's manual

Ratings & Reviews

Overall Customer Rating:

4.8

(145 Reviews)

95% of customers would recommend this product to a friend (138 out of 145)

See All 145 Reviews

Powered by the NVIDIA GeForce GTX 980 graphics processing unit (GPU)

With 1126MHz base clock and 1216MHz boost clock speeds to help meet the requirements of a variety of games.

4GB GDDR5 (256-bit) on-board memory

With 2048 CUDA processing cores provides the memory needed to recreate game visuals with striking realism.

PCI Express 3.0 interface

Provides compatibility with a range of systems.

NVIDIA SLI-ready

Transmits synchronization, display and pixel data for reliable connection between GPUs (additional graphics cards not included).

NVIDIA CUDA technology

Harnesses the power of the graphics processing unit (GPU) to optimize computing performance.

NVIDIA G-Sync technology

Offers smooth, low-latency gameplay. Dynamic Super Resolution technology provides a 4K experience on a 1080p display.

NVIDIA SHIELD-ready

So you can stream PC games. NVIDIA GameStream enables portable gameplay, while GeForce Experience and NVIDIA ShadowPlay let you record and share important gaming moments.

NVIDIA technologies

Include GameWorks, Adaptive Vertical Sync, Surround and more for enhanced visuals.

OpenGL 4.4 and OpenCL support

To help meet the needs of OpenGL API and GPGPU computing.

Dual-link DVI-I, HDMI 2.0 and 3 DisplayPort 1.2 outputs

Enable flexible connectivity.

Specifications

Ratings & Reviews

Accessories

Product images, including color, may differ from actual product appearance.

Exhibit X

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NVIDIA - SHIELD K1 - 8" - Tablet - 16GB - Black

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Model: 940817612500500 **SKU:** 4701400 **4.5** (186)
3 Questions, 4 Answers (<https://web.archive.org/web/20170129213017/http://www.bestbuy.com/site/questions/nvidia-shield-k1-8-tablet-16gb-black/4701400>)

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id=pcat17098&skuld=4701400&type=page&index3=inde

Click or tap to enlarge

Images

Interactive Features
([https://web.archive](https://web.archive.org))

NVIDIA SHIELD K1 Tablet: Game your way to greatness with a responsive 8" multitouch screen, 192-core NVIDIA Kepler GPU and support for Full HD 1080p resolution. Plus, you can snap high-quality photos and enjoy video chatting with the 5.0MP HDR front- and rear-facing cameras.




Tablet Buying Guide ›



(/web/20170129213017/http://www.bestbuy.com/site/computing-promotions/tablet-buying-guide/pcmcat310900050011.c?id=pcmcat310900050011&type=category)

<http://www.bestbuy.com/site/nvidia-shield-k1-8-tablet-16gb-black/4701400.p?skuld=4701400>

NOV **JAN 29** APR

2016 **2017** 2018

[About this capture](#)

What's Included

- SHIELD K1 - 8" - Tablet - 16GB
- Lithium-ion battery
- Owner's manual

Ratings & Reviews

Overall Customer Rating:
4.5

(186 Reviews)

92% of customers would recommend this product to a friend (172 out of 186)

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Services

Extend your coverage with Geek Squad Protection

Included Free



Webroot Secure Anywhere - 3-Device - 6 Months Subscription - Android/iOS - Mac/Windows [Download]

Security software to protect any combination of up to 3 PC, Mac and Mobile Devices (Android tablets and smartphones, iOS and Windows Phones). Defends against viruses, malware, phishing attacks and other online threats.

BestBuy.com account required. Download instructions are usually e-mailed within 30 min.

Product Features

Android operating system

Productivity and entertainment at your fingertips. Download apps, games, movies, music and eBooks from Google Play. Cloud integration provides a seamless experience across all Android devices.

8" multitouch screen with 1920 x 1200 resolution

Supports Full HD 1080p content and features IPS (in-plane switching) technology for wide viewing angles.

16GB internal storage plus microSD slot

Plenty of space for music, movies, photos and more. Expand storage up to 128GB with a microSD card (sold separately).

Quad-core processor

The right combination of fast performance and power efficiency. It allows rapid multitasking, delivers smooth response and unleashes stunning graphics.

Dual HD cameras for photos and face-to-face chat

5.0MP HDR front-facing and 5.0MP autofocus HDR rear-facing cameras.

Experience a realistic picture

A 192-core NVIDIA Kepler GPU stands up to intense graphics.

Connect to your HDTV

The HDMI output allows flexible connectivity.

Dual front-facing speakers

Let you listen to your favorite tunes. A 3.5mm stereo headphone jack with microphone support allows private listening.

Specifications



Ratings & Reviews



Accessories



Protection & Services



From the Manufacturer



Product images, including color, may differ from actual product appearance.

http://www.bestbuy.com/site/nvidia-shield-k1-8-tablet-16gb-black/4701400.p?skuld=4701400

Go

NOV

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APR

8 captures

23 Sep 2016 - 7 Mar 2018

2016

2017

2018

About this capture

Exhibit Y

From: Williamson, Carrie
To: [Garten, Thomas E](#); [NVIDIA-Tessera-DLA](#)
Cc: [Xperi-NVIDIA](#); [Brian Farnan](#); [Michael J. Farnan](#)
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues - RESTRICTED - OUTSIDE ATTORNEYS' EYES ONLY INFORMATION
Date: Monday, April 13, 2020 9:30:03 PM

[EXTERNAL]

CONTAINS RESTRICTED – OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

Tom,

NVIDIA Corporation's financial spreadsheets produced in the litigation include [REDACTED]
[REDACTED] To address your last question, and in order to resolve this dispute and for the purpose of this litigation only, Defendant is willing to agree that all of the sales listed in the spreadsheets that have been produced occurred within the United States.

[REDACTED]
[REDACTED]
[REDACTED]

Regards,
Carrie

From: Garten, Thomas E <tgarten@cov.com>
Sent: Friday, April 10, 2020 4:29 PM
To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues

[EXTERNAL]

Carrie:

In your letter brief and during our meet and confer, you represented that the financial data the NVIDIA has produced in this action reflects all of NVIDIA Corporation's sales of accused products since May 2013, regardless of where the products were shipped. It is the case, however, that NVIDIA Corporation's sales are only made for shipment to the United States? In other words, is it the case that -- in actuality -- the financial data that you have produced reflects only sales of products shipped to the United States? If not, and NVIDIA Corporation's sales during the relevant period include sales of products shipped outside of the United States, then how does the data produced by NVIDIA allow Plaintiffs or Defendant to determine precisely which sales are made "within the United States" per 35 U.S.C. § 271(a)?

We would appreciate a prompt response.

Best regards,
Tom

Exhibit 2

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

INVENSAS CORPORATION and TESSERA
ADVANCED TECHNOLOGIES, INC.,

Plaintiffs,

No.

1:19-cv-00861-RGA

V.

NVIDIA CORPORATION, [NVIDIA SINGAPORE PTE. LTD.](#), and [NVIDIA INTERNATIONAL, INC.](#),

JURY TRIAL DEMANDED

FILED UNDER SEAL

~~Defendant~~ Defendants.

CONTAINS RESTRICTED –
OUTSIDE ATTORNEYS’ EYES
ONLY INFORMATION

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

Plaintiffs Invensas Corporation and Tessera Advanced Technologies, Inc. (collectively “Plaintiffs”) bring this complaint for patent infringement against Defendant NVIDIA Corporation (~~Defendant NVIDIA Singapore Pte. Ltd., and Defendant NVIDIA International, Inc.~~ (collectively “NVIDIA” or “~~Defendant~~Defendants”). Plaintiffs, on personal knowledge as to their own acts, and on information and belief as to all others based on investigation, allege as follows:

NATURE OF THE ACTION

1. This is a civil action for infringement of United States Patent Nos. 6,232,231 (“the ‘231 patent”), 6,849,946 (“the ‘946 patent”), 7,064,005 (“the ‘005 patent”), and 6,317,333 (“the ‘333 patent”), ~~and 5,666,046 (“the ‘046 patent”)~~ (collectively, the “Asserted Patents”) under the patent laws of the United States, 35 U.S.C. § 1, *et seq.*

THE PARTIES

2. Plaintiff Invensas Corporation is a Delaware corporation with its principal place of business at 3025 Orchard Parkway, San Jose, California 95134.

3. Plaintiff Tessera Advanced Technologies, Inc. is a Delaware corporation with its principal place of business at 3025 Orchard Parkway, San Jose, California 95134.

4. Defendant NVIDIA Corporation is a Delaware corporation with its principal place of business at 2788 San Tomas Expressway, Santa Clara, California 95051. NVIDIA [Corporation](#) may be served through its registered agent, Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808.

5. On information and belief, Defendant NVIDIA Singapore Pte. Ltd. (“NVIDIA Singapore”) is an entity organized under the laws of Singapore with its principal place of business located at 3/F Harbour View 1, No. 12 Science Park East Avenue, HK Science Park, Shatin, Hong Kong. On information and belief, NVIDIA Singapore may be served at its registered office, which is located at 112 Robinson Road, #05-01, Singapore 068902.

6. On information and belief, Defendant NVIDIA International, Inc. (“NVIDIA International”) is an entity organized under the laws of the Cayman Islands. On information and belief, NVIDIA International may be served through its registered agent, Genesis Trust & Corporate Services Ltd., which maintains a mailing address of P.O. Box 448, Elgin Court, Elgin Avenue, George Town, Grand Cayman KY1-1106, Cayman Islands.

7. On information and belief, NVIDIA Corporation wholly owns NVIDIA International, Inc., which wholly owns NVIDIA Singapore Pte. Ltd.

JURISDICTION AND VENUE

8. ~~5.~~ The Court has subject matter jurisdiction over the matters pleaded herein under 28 U.S.C. §§ 1331 and 1338(a) and the patent laws of the United States, 35 U.S.C. § 1, *et seq.*

NVIDIA Corporation

9. ~~6.~~ The Court has personal jurisdiction over NVIDIA [Corporation](#) at least because NVIDIA [Corporation](#) is organized and exists under the laws of the State of Delaware. On

information and belief, NVIDIA [Corporation](#) has regularly and systematically transacted business in and with residents of the State of Delaware, directly or through intermediaries, and/or committed acts of infringement in the State of Delaware as alleged more particularly below.

NVIDIA [Corporation](#) has also placed infringing products into the stream of commerce by shipping those products into the State of Delaware or by knowing that the products would be shipped into the State of Delaware. Plaintiffs' causes of action arise, at least in part, from NVIDIA [Corporation](#)'s contacts with and activities in the State of Delaware.

10. ~~7.~~ Venue is proper in this judicial district pursuant to 28 U.S.C. §§ 1400 and 1391(b) and (c) because NVIDIA [Corporation](#), as a Delaware corporation, resides in this judicial district. In addition, NVIDIA [Corporation](#) has committed acts of infringement in the State of Delaware, including by selling and distributing infringing products in the State of Delaware.

NVIDIA Singapore Pte. Ltd.

Personal Jurisdiction Under Delaware Long-Arm Statute/Stream of Commerce

11. This Court has personal jurisdiction over NVIDIA Singapore pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the “dual jurisdiction” or “stream of commerce” test, as explained below.

12. Under the stream of commerce test, personal jurisdiction is established over a foreign defendant such as NVIDIA Singapore by showing three things: (1) an intent to serve the Delaware market; (2) the introduction of products into the market as a result of this intent; and (3) that Plaintiffs' cause of action arises from injuries caused by those products. *3G Licensing, S.A. v. HTC Corp.*, No. 17-cv-83-LPS-CJB, 2017 WL 6442101, at *2 (D. Del. Dec. 18, 2017). As to the first prong, a non-resident firm's “intent to serve the United States market is sufficient to establish an intent to serve the Delaware market, unless there is evidence that the firm intended to exclude from its marketing and distribution efforts some portion of the country that includes Delaware.”

Enzo Life Scis., Inc. v. Hologic Inc., No. 16-cv-894-LPS-CJB, 2018 WL 4660355, at *3 n.5 (D. Del. Sept. 26, 2018) (quoting Robert Bosch LLC v. Alberee Prod., Inc., 70 F. Supp. 3d 665, 675 (D. Del. 2014)).

First Prong: Intent to Serve the United States Market, Including Delaware

13. On information and belief, during the time period relevant to this lawsuit, including from at least 2013 to 2018, NVIDIA Singapore intended to serve the United States market with products, including computer graphics cards comprising NVIDIA graphics processing units (“GPUs”) and NVIDIA SHIELD tablet and SHIELD TV products comprising NVIDIA Tegra systems-on-a-chip (“SoCs”). As explained below, Plaintiffs accuse these products of infringing the Asserted Patents. *See infra* ¶¶ 66–72, 80–81, 89–90, 98–99, 105, 113–114, 120–121, 128–129, 135.

14. NVIDIA Singapore’s intent to serve the United States market, including Delaware, is demonstrated by the fact that from 2013 through 2018, NVIDIA Singapore shipped several tons of products from Hong Kong to the United States. NVIDIA Singapore’s U.S. affiliate NVIDIA Corporation received these shipments in the United States. Importation records describe these shipments as containing computer graphics cards and Shield products, as summarized in the table below.

Year	Shipper	Consignee	Description	Shipments
2013	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	3
2014	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	10
2015	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	1
2016	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	3
2017	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Computer Graphics Cards	2
			Shield	2
2018	NVIDIA Singapore Pte Ltd	NVIDIA Corp	Shield	1
Total:				22

See Exs. F–K (U.S. importation records from 2013 through 2018).

15. The total reported weight of these 22 shipments is 53,759 kilograms, which is about 118,518 pounds or 59 tons. On information and belief, NVIDIA Singapore has made additional shipments to the United States of computer graphics cards and SHIELD products beyond those summarized in the table above.

16. NVIDIA Singapore's intent to serve the United States market, including Delaware, is also demonstrated by the fact that, on information and belief, the primary purpose of NVIDIA Singapore is to sell NVIDIA products worldwide, and U.S. consumers account for a significant portion of the worldwide demand for NVIDIA products sold by NVIDIA Singapore. NVIDIA Singapore has repeatedly stated in its annual financial statements that "[t]he principal activity of the Company consists of sales of graphics processors and media and communication devices." See, e.g., Ex. L at 10 (financial statement for fiscal year ending January 25, 2015); Ex. M at 8 (financial statement for fiscal year ending January 31, 2016). Furthermore, as summarized in the table below, NVIDIA Singapore generates the vast majority of all revenue reported by NVIDIA Corporation on a consolidated basis:

<u>Fiscal Year Ending In</u>	<u>NVIDIA Singapore Revenue</u>	<u>NVIDIA Corporation Revenue (Consolidated) (Ex. Q at 23)</u>
<u>2015</u>	<u>\$ 3,885,594,000 (Ex. L at 6)</u>	<u>\$ 4,682,000,000</u>
<u>2016</u>	<u>\$ 4,077,896,000 (Ex. M at 4)</u>	<u>\$ 5,010,000,000</u>
<u>2017</u>	<u>\$ 5,712,400,000 (Ex. N at 5)</u>	<u>\$ 6,910,000,000</u>
<u>2018</u>	<u>\$ 8,064,722,000 (Ex. O at 5)</u>	<u>\$ 9,714,000,000</u>
<u>2019</u>	<u>\$ 9,727,059,000 (Ex. P at 5)</u>	<u>\$ 11,716,000,000</u>
<u>Total:</u>	<u>\$ 31,467,671,000</u>	<u>\$ 38,032,000,000</u>

17. During the five fiscal years summarized above, NVIDIA Corporation reported roughly \$38 billion in worldwide revenue on a consolidated basis, and NVIDIA Singapore reported roughly \$31.5 billion in revenue. In other words, NVIDIA Singapore generated roughly 83 percent of NVIDIA Corporation's worldwide revenue. NVIDIA Singapore's outside role in

generating revenue for NVIDIA Corporation demonstrates an intent by NVIDIA Singapore to serve the United States market because, on information and belief, U.S. consumers provide a significant portion of the worldwide demand for NVIDIA products sold by NVIDIA Singapore.

18. NVIDIA Singapore’s intent to serve the United States market, including Delaware, is also demonstrated by the fact that in 2014, in the midst of shipping accused products to the United States, [REDACTED] to a protected communications agreement (“PCA”) with Plaintiffs’ U.S.-based parent company, Xperi (formerly known as Tessera). The PCA demonstrates an intent to serve the United States market because Xperi licenses U.S. patents that are relevant to the products that NVIDIA Singapore has sold and has shipped to the United States. Additionally, the PCA demonstrates an intent to serve the United States market because it provides that any disputes arising out of the PCA are to be decided in Delaware applying Delaware law, and not in Singapore or Hong Kong. See D.I. 51 (9/17/2019 Hr’g Tr.) at 13:16–18.

19. Finally, NVIDIA Singapore’s intent to serve the United States market, including Delaware, is demonstrated by the fact that, as summarized in the table below, three of its four directors reside in the United States (rather than in Singapore or Hong Kong) and also work for NVIDIA Corporation, which is based in the United States and incorporated in Delaware. Furthermore, one of NVIDIA Singapore’s directors, Michael John Byron, is specifically “engaged in sales and marketing and/or finance for the Accused Products” at NVIDIA Corporation. D.I. 19 (8/20/2019 Declaration of Joseph Greco) ¶ 12.

<u>NVIDIA Singapore Director</u>	<u>Country of Residence</u>	<u>Position at NVIDIA Corp.</u>
<u>Michael John Byron</u>	<u>United States</u>	<u>Vice President, Finance Operations and Systems</u>
<u>Karen Theresa Burns</u>	<u>United States</u>	<u>Vice President, Finance</u>
<u>Rebecca Peters</u>	<u>United States</u>	<u>Vice President, Corporate Affairs</u>

Ex. R at 5 (NVIDIA Singapore Corporate Compliance and Financial Profile).

20. On information and belief, NVIDIA Singapore has not excluded any portion of the United States that includes Delaware from its efforts to sell and ship products to the United States that comprise NVIDIA GPUs and Tegra SoCs.

21. In sum, during the time period relevant to this case, NVIDIA Singapore has intended to serve the United States market, including Delaware, because on information and belief (1) NVIDIA Singapore has shipped several tons of products to the United States comprising NVIDIA GPUs and Tegra SoCs, (2) NVIDIA Singapore has generated the vast majority of NVIDIA Corporation's worldwide revenue, much of which is attributable to demand for NVIDIA products by U.S. consumers, (3) [REDACTED] a PCA with Plaintiffs' U.S.-based parent company, and the PCA provides that any disputes arising under the PCA are to be decided in Delaware under Delaware law, (4) most of NVIDIA Singapore's directors are U.S. residents who also work for NVIDIA Corporation, and (5) NVIDIA Singapore has not sought to exclude any portion of the United States that includes Delaware from its efforts to sell and ship products to the United States.

Second Prong: Introduction of Products Into the United States Market

22. On information and belief, NVIDIA Singapore's intent to serve the United States market resulted in the introduction of products into the United States market, including in Delaware.

23. For example, on information and belief, computer graphics cards comprising infringing NVIDIA GPUs have been sold nationwide at Best Buy stores. A page on NVIDIA Corporation's website lists dozens of models and describes them as having been "sold at NVIDIA.com and Best Buy." Ex. S.

24. On information on belief, Best Buy has maintained and continues to maintain several stores in Delaware, including in Wilmington at 4807 Concord Pike (Ex. T), in Dover at 1165 N. Dupont Hwy (Ex. U), and in Newark at 2700 Fashion Center Blvd. (Ex. V).¹

25. On information and belief, computer graphics cards containing infringing NVIDIA GPUs were shipped to the United States by NVIDIA Singapore, received by NVIDIA Corporation, and then sold at Best Buy locations in Delaware. For example, in November 2016, Best Buy's website advertised the GeForce GTX 980 graphics card as "ON SALE" and included a link for consumers to "Check Stores" for the graphics card. Ex. W. As previously noted, NVIDIA Singapore sent three shipments to the United States in 2016 that were described as containing computer graphics cards. See supra ¶ 14.

26. On information and belief, products containing infringing NVIDIA Tegra SoCs were shipped to the United States by NVIDIA Singapore, received by NVIDIA Corporation, and then sold at Best Buy locations in Delaware. For example, in January 2017, Best Buy's website advertised the NVIDIA SHIELD K1 tablet. Ex. X. As previously noted, NVIDIA Singapore sent two shipments to the United States in 2017 that were described as containing SHIELD products. See supra ¶ 14.

Third Prong: Cause of Action Arises from Injuries Caused by Products

27. Plaintiffs' cause of action for infringement of the Asserted Patents arises from injuries caused by products introduced to the United States market, including Delaware, as a result of NVIDIA Singapore's intent to serve the United States market, including Delaware. As explained further below, Plaintiffs allege that NVIDIA GPUs and NVIDIA SoCs infringe the

¹ The foregoing exhibits each consist of a current website print-out reflecting Best Buy operations today, as well as a historical version of the same website from the Wayback Machine showing Best Buy stores at the same locations in 2015 or 2016. See Exs. T–V.

Asserted Patents. See *infra* ¶¶ 66–72, 80–81, 89–90, 98–99, 105, 113–114, 120–121, 128–129, 135. Unlicensed usage, offers for sale, and sales of these products in the United States, and unlicensed importation of these products into the United States, injured Plaintiffs.

28. In sum, this Court has personal jurisdiction over NVIDIA Singapore pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the stream of commerce test.

Personal Jurisdiction Under Fed. R. Civ. P. 4(k)(2)

29. Alternatively, this Court has personal jurisdiction over NVIDIA Singapore pursuant to the federal long-arm statute, Fed. R. Civ. P. 4(k)(2).²

30. Rule 4(k)(2) allows “ ‘a court to exercise personal jurisdiction over a defendant if (1) the plaintiff’s claim arises under federal law, (2) the defendant is not subject to jurisdiction in any state’s courts of general jurisdiction, and (3) the exercise of jurisdiction comports with due process.’ ” *Bos. Sci. Corp. v. Micro-Tech Endoscopy USA Inc.*, No. 18-cv-1869-CFC-CJB, 2020 WL 229993, at *4 (D. Del. Jan. 15, 2020) (quoting *M-I Drilling Fluids UK Ltd. v. Dynamic Air Ltda.*, 890 F.3d 995, 999 (Fed. Cir. 2018)), *report and recommendation adopted*, No. 18-cv-1869-CFC-CJB, 2020 WL 564935 (D. Del. Feb. 5, 2020). “ ‘The third requirement under Rule 4(k)(2)—the due process analysis—contemplates a defendant’s contacts with the entire United States, as opposed to the state in which the district court sits.’ ” *Id.* (same). Rule 4(k)(2) is meant to allow a district court to exercise personal jurisdiction over a foreign defendant whose contacts with the United States, but not with the forum state, satisfy due process. *Id.* (citing *M-I Drilling*, 890 F.3d at 999).

² Pleading personal jurisdiction alternatively under Rule 4(k)(1) and Rule 4(k)(2) is proper under Fed. R. Civ. P. 8(d). See *Touchcom, Inc. v. Bereskin & Parr*, 574 F.3d 1403, 1415 (Fed. Cir. 2009) (analyzing application of Fed. R. Civ. P. 4(k)(2) and noting that “[a]n approach that forecloses alternative arguments appears to conflict with the Federal Rules of Civil Procedure”).

First Prong: Plaintiffs' Claims Arise Under Federal Law

31. Plaintiffs allege that NVIDIA Singapore is liable for patent infringement pursuant to 35 U.S.C. § 271. Thus, Plaintiffs' claims arise under federal law.

Second Prong: Not Subject to Jurisdiction in Any State's Courts of General Jurisdiction

32. On information and belief, NVIDIA Singapore is incorporated in Singapore, maintains its principal place of business in Hong Kong, and does not maintain any offices or subsidiaries in the United States. On information and belief, NVIDIA Singapore is not subject to jurisdiction in any state's courts of general jurisdiction.

Third Prong: Due Process

33. In analyzing due process in connection with Rule 4(k)(2), courts consider whether (1) the defendant purposefully directed its activities at residents of the United States, (2) the claim arises out of or relates to the defendant's activities with the United States, and (3) assertion of personal jurisdiction is reasonable and fair. *Bos. Sci. Corp.*, 2020 WL 229993, at *6.

34. NVIDIA Singapore purposefully directed its activities at residents of the United States. First, as explained above on information and belief in paragraphs 14–15 and 23–26, which are incorporated by reference, over a period of several years NVIDIA Singapore regularly shipped tons of products, including accused products, to its affiliate in the United States, NVIDIA Corporation. These products were then sold nationwide, including, for example, at Best Buy. Second, as explained above on information and belief in paragraphs 16–17, which are incorporated by reference, NVIDIA Singapore generates the vast majority of revenue for NVIDIA Corporation, which is incorporated in and based in the United States, and U.S. consumers provide a significant portion of worldwide demand for NVIDIA products sold by NVIDIA Singapore. Third, as explained above on information and belief in paragraph 18, which is incorporated by reference, in the midst of shipping accused products to the United States in 2014, [REDACTED]

██████ a PCA with Plaintiffs' U.S.-based parent company Xperi, and under the PCA, any disputes arising out of the PCA are to be decided in Delaware and applying Delaware law. Fourth and finally, as explained above on information and belief in paragraph 19, which is incorporated by reference, most of NVIDIA Singapore's directors reside in the United States and also work for NVIDIA Corporation, which is based in the United States.

35. Plaintiffs' infringement claims against NVIDIA Singapore arise out of or relate to NVIDIA Singapore's activities with the United States. In particular, NVIDIA Singapore sold products that are accused in this case and also shipped accused products to the United States. The unlicensed use, sale, and offer for sale of these accused products in the United States, and unlicensed importation of them into the United States, provide the basis for Plaintiffs' infringement claims.

36. Assertion of personal jurisdiction over NVIDIA Singapore is reasonable and fair. Any burden on NVIDIA Singapore is sufficiently outweighed by the interest of the United States in adjudicating Plaintiffs' claims, which are based on infringement of U.S. patents, and by the interests of Plaintiffs in obtaining effective and convenient relief. *Bos. Sci. Corp.*, 2020 WL 229993, at *7–*8.

37. In sum, this Court alternatively has personal jurisdiction over NVIDIA Singapore pursuant to Fed. R. Civ. P. 4(k)(2).

Venue

38. When a foreign defendant is sued in a patent infringement action, 28 U.S.C. § 1391 governs venue. See *3G Licensing*, 2017 WL 6442101, at *2. Under § 1391, a foreign defendant may be sued in any judicial district. See 28 U.S.C. § 1391(c)(3). On information and belief, NVIDIA Singapore is incorporated in Singapore. NVIDIA Singapore is a foreign defendant that may be sued in any judicial district. Therefore, venue is proper here in the District of Delaware.

NVIDIA International, Inc.

Personal Jurisdiction Under Delaware Long-Arm Statute/Stream of Commerce

39. This Court has personal jurisdiction over NVIDIA International, Inc. pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the stream of commerce test, as explained below.

First Prong: Intent to Serve the United States Market, Including Delaware

40. On information and belief, during the time period relevant to this lawsuit, NVIDIA International intended to serve the United States market with products, including computer graphics cards comprising NVIDIA GPUs and/or NVIDIA SHIELD tablet and SHIELD TV products comprising NVIDIA Tegra SoCs.

41. Specifically, in connection with this lawsuit, counsel for NVIDIA Corporation represented to Plaintiffs that (1) [REDACTED] and that (2) [REDACTED] [REDACTED] [REDACTED]. Ex. Y (4/13/2020 Email from C. Williamson); D.I. 136 (4/29/2020 Joint Discovery Letter Brief) at 5, 6.

42. Based on this information from NVIDIA Corporation's counsel, Plaintiffs allege on information and belief that during the time period relevant to this lawsuit, [REDACTED] [REDACTED] [REDACTED]. These actions demonstrate an intent by NVIDIA International to serve the United States market, including Delaware.

43. NVIDIA International's intent to serve the United States market, including Delaware, is also demonstrated by the fact that [REDACTED]

to the 2014 protected communications agreement (PCA) with Plaintiffs' U.S.-based parent company, Xperi. The PCA demonstrates an intent to serve the United States market because Xperi licenses U.S. patents that are relevant [REDACTED]. Additionally, [REDACTED] PCA with Xperi demonstrates an intent to serve the United States market because it provides that any disputes arising out of the PCA are to be decided in Delaware applying Delaware law, and not in the Cayman Islands.

44. NVIDIA International’s intent to serve the United States, including Delaware, is also demonstrated by the fact that, on information and belief, NVIDIA International wholly owns—and is wholly owned by—entities that intend to serve the United States market, including Delaware. Specifically, NVIDIA International wholly owns NVIDIA Singapore, which for the reasons explained above, intends to serve the United States market, including Delaware. See Ex. P at 35 (NVIDIA Singapore 2019 financial statement) (“The Company’s immediate holding corporation is Nvidia International Inc., incorporated in the Cayman Islands.”); see *supra* ¶¶ 13–37 (allegations describing activities of NVIDIA Singapore). Additionally, NVIDIA International is wholly owned by NVIDIA Corporation, which is based in the United States, imports accused products into the United States, and markets and sells accused products throughout the United States.

45. NVIDIA International's intent to serve the United States, including Delaware, is also demonstrated by the fact that, on information and belief, one of NVIDIA International's directors, Karen Burns, resides in the United States (not in the Cayman Islands) and also works for NVIDIA Corporation as its vice president of finance, and also serves as a director of NVIDIA Singapore. As previously mentioned, both NVIDIA Corporation and NVIDIA Singapore intend to

serve the United States, including Delaware. Ms. Burns' common involvement in all three entities demonstrates that NVIDIA International intends to serve the United States market, including Delaware, just like NVIDIA Singapore and NVIDIA Corporation.³

46. On information and belief, NVIDIA International has not excluded any portion of the United States that includes Delaware from [REDACTED]

[REDACTED] :

47. In sum, during the time period relevant to this case, NVIDIA International has intended to serve the United States market, including Delaware, because on information and belief

(1) [REDACTED]

[REDACTED], (2) [REDACTED] to a PCA with Plaintiffs' U.S.-based parent company, which provides that any disputes arising under the PCA are to be decided in Delaware under Delaware law, (3) NVIDIA International wholly owns, and is wholly owned by, affiliated entities that intend to serve the United States market, (4) one of NVIDIA International's directors holds the same position at NVIDIA Singapore (a frequent shipper of NVIDIA products to the United States) and also works for NVIDIA Corporation in the United States, and (5) NVIDIA International has not sought to exclude any portion of the United States that includes Delaware from [REDACTED]

[REDACTED]

³ Ms. Burns' involvement as a director of NVIDIA International, Inc. was revealed in 2017 as part of the "Paradise Papers," which include leaked documents related to offshore companies in tax havens like the Cayman Islands. *See* <https://offshoreleaks.icij.org/nodes/101418482>

Second Prong: Introduction of Products Into the United States Market

48. On information and belief, NVIDIA International's intent to serve the United States market resulted in the introduction of products into the United States market, including in Delaware.

49. As explained above on information and belief in connection with NVIDIA Singapore in paragraphs 22–26, which are incorporated by reference, accused products have been sold nationwide at Best Buy, including computer graphics cards with infringing NVIDIA GPUs and NVIDIA SHIELD products with infringing Tegra SoCs. Best Buy has maintained and continues to maintain multiple stores in Delaware, and, on information and belief, accused products have been sold at these stores.

50. On information and belief, [REDACTED] [REDACTED] include NVIDIA computer graphics cards and SHIELD products that were sold at Best Buy locations in Delaware.

Third Prong: Cause of Action Arises from Injuries Caused by Products

51. Plaintiffs' cause of action for infringement of the Asserted Patents arises from injuries caused by products introduced to the United States market, including Delaware, as a result of NVIDIA International's intent to serve the United States market, including Delaware. As explained further below, Plaintiffs allege that NVIDIA GPUs and NVIDIA SoCs infringe the Asserted Patents. See *infra* ¶¶ 66–72, 80–81, 89–90, 98–99, 105, 113–114, 120–121, 128–129, 135. Unlicensed usage, offers for sale, and sales of these products in the United States, and unlicensed importation of these products into the United States, injured Plaintiffs.

52. In sum, this Court has personal jurisdiction over NVIDIA International pursuant to the Delaware long-arm statute (10 Del. C. § 3104(c)) and the stream of commerce test.

Personal Jurisdiction Under Fed. R. Civ. P. 4(k)(2)

53. Alternatively, this Court has personal jurisdiction over NVIDIA International pursuant to the federal long-arm statute, Fed. R. Civ. P. 4(k)(2).

First Prong: Plaintiffs' Claims Arise Under Federal Law

54. Plaintiffs allege that NVIDIA International is liable for patent infringement pursuant to 35 U.S.C. § 271. Thus, Plaintiffs' claims arise under federal law.

Second Prong: Not Subject to Jurisdiction in Any State's Courts of General Jurisdiction

55. On information and belief, NVIDIA International is incorporated in the Cayman Islands and does not maintain any offices or subsidiaries in the United States. On information and belief, NVIDIA International is not subject to jurisdiction in any state's courts of general jurisdiction.

Third Prong: Due Process

56. NVIDIA International purposefully directed its activities at residents of the United States. First, as explained above on information and belief in paragraphs 41–42 and 48–50, which are incorporated by reference, [REDACTED]

[REDACTED]
[REDACTED] Second, as explained above on information and belief in paragraph 43, which is incorporated by reference, in 2014,
[REDACTED] to a PCA with Plaintiffs' U.S.-based parent company Xperi,
and the PCA provides that any disputes arising out of the PCA are to be decided in Delaware and by applying Delaware law. Third, as explained above on information and belief in paragraph 44,
which is incorporated by reference, NVIDIA International wholly owns, and is wholly owned by,
affiliated entities that intend to serve the United States market. Fourth and finally, as explained above on information and belief in paragraph 45, which is incorporated by reference, NVIDIA

International's director Ms. Karen Burns also serves as a director for NVIDIA Singapore, which has shipped tons of products to the United States, and she resides in the United States and works for NVIDIA Corporation, which is based in and serves the United States.

57. Plaintiffs' infringement claims against NVIDIA International arise out of or relate to NVIDIA International's activities with the United States. In particular, [REDACTED]

[REDACTED]
The unlicensed use, sale, and offer for sale of these accused products in the United States, and unlicensed importation of them into the United States, provide the basis for Plaintiffs' infringement claims.

58. Assertion of personal jurisdiction over NVIDIA International is reasonable and fair. Any burden on NVIDIA International is sufficiently outweighed by the interest of the United States in adjudicating Plaintiffs' claims, which are based on infringement of U.S. patents, and by the interests of Plaintiffs in obtaining effective and convenient relief.

59. In sum, this Court alternatively has personal jurisdiction over NVIDIA International pursuant to Fed. R. Civ. P. 4(k)(2).

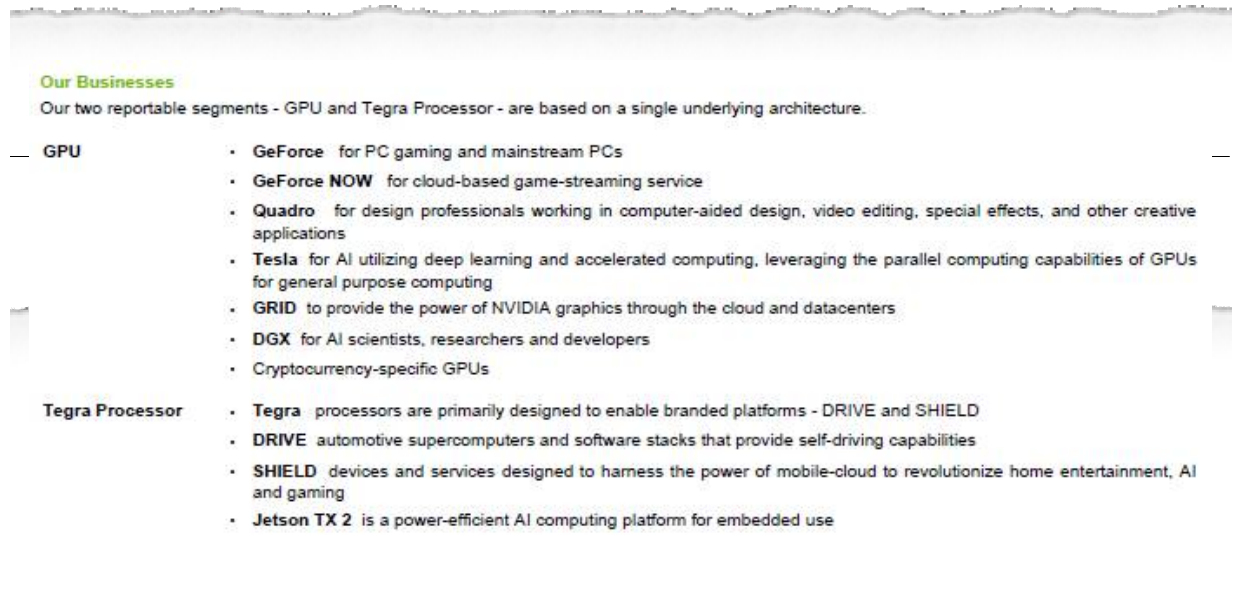
Venue

60. On information and belief, NVIDIA International, Inc. is incorporated in the Cayman Islands. NVIDIA International is a foreign defendant that may be sued in any judicial district. See 28 U.S.C. § 1391(c)(3). Therefore, venue is proper here in the District of Delaware.

NVIDIA'S INFRINGING PRODUCTS AND ACTIVITIES

61. ~~8.~~NVIDIA Corporation, including its subsidiaries NVIDIA Singapore and NVIDIA International, is a global supplier of graphics processing units ("GPUs") and system-on-a-chip processors (SoCs) that incorporate GPUs and multi-core CPUs to drive supercomputing. *See* 2018 NVIDIA Corporation Form 10-K, p. 23. NVIDIA Corporation's two

reportable segments, GPU and Tegra Processor, are based on a single underlying graphics architecture. *See id.* NVIDIA's GPU and Tegra SoC platforms serve many markets, from consumer PC gaming to enterprise workstations to government and cloud service provider datacenters. *See id.*, p. 9.



Source: 2018 NVIDIA [Corporation](#) Form 10-K, p. 5.

62. ~~9.~~ NVIDIA does not directly manufacture semiconductor wafers used for its products. Instead, NVIDIA utilizes a “fabless” manufacturing strategy, whereby NVIDIA employs third party suppliers for wafer fabrication, assembly, testing, and packaging. *See* 2018 NVIDIA Form 10-K, p. 9. This allows NVIDIA to “focus [its] resources on product design, additional quality assurance, marketing, and customer support.” *Id.* On information and belief, the bulk of NVIDIA’s semiconductor wafers are fabricated by Taiwan Semiconductor Manufacturing Company Limited (“TSMC”).

63. ~~10.~~ For fiscal years 2013 through 2018, NVIDIA [Corporation](#) reported global revenues of more than \$34 billion. On information and belief, a substantial portion of this revenue is attributable to infringing sales made in the United States, including, without limitation: (a)

NVIDIA products sold directly to consumers and companies in the United States; (b) NVIDIA products sold abroad and with knowledge that those products would be incorporated in finished products and then imported into the United States for sale and/or use; and (c) NVIDIA products nominally sold abroad but for which substantial activities underlying the sales transactions (e.g., design-win activities, negotiations, testing, qualification) take place in the United States.

64. ~~11.~~ NVIDIA [Corporation](#) acknowledges that for products not sold directly to consumers, “achieving design wins is an important success factor.” 2018 NVIDIA [Corporation](#) Form 10-K, p. 14. “Achieving design wins may involve a lengthy process in pursuit of a customer opportunity and depend on our ability to anticipate features and functionality that customers and consumers will demand.” *Id.* To that end, NVIDIA [Corporation](#) has deemed it critical to employ sales teams with “a high level of technical expertise and product and industry knowledge to support the competitive and complex design win process,” along with a “highly skilled team of application engineers to assist our Channel in designing, testing, and qualifying system designs that incorporate our products.” 2016 NVIDIA [Corporation](#) Form 10-K, p. 7. On information and belief, the sales teams and application engineers referenced in NVIDIA [Corporation](#)’s Form 10-K filing are located primarily in the United States.

65. ~~12.~~ NVIDIA [Corporation](#) also works in collaboration with industry leaders to develop products: “We invest significant resources in the development of relationships with industry leaders, often assisting these companies in the product definition of their new products. We believe that forming these relationships and utilizing next-generation development tools to design, simulate and verify our products will help us remain at the forefront of visual computing and develop products that utilize leading-edge technology on a rapid basis.” 2017 NVIDIA [Corporation](#) Form 10-K, p. 10.

66. ~~13.~~ NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 40nm Fermi GPUs, including products with the part name or number GF100, GF104, GF106, GF108, GF110, GF114, GF116, GF117, GF118, and GF119 (the “40nm Fermi GPUs”). On information and belief, NVIDIA 40nm Fermi GPUs are made using TSMC’s 40nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 40nm Fermi GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

C2070 GPU Computing Module	GeForce GT 545	GeForce GTX 560 Ti
C2075 GPU Computing Module	GeForce GT 550M	GeForce GTX 560M
GeForce 410M	GeForce GT 555M	GeForce GTX 570
GeForce 510	GeForce GT 610	GeForce GTX 570M
GeForce 605	GeForce GT 620	GeForce GTX 580
GeForce 610M	GeForce GT 620M	GeForce GTX 580M
GeForce 710M	GeForce GT 625	GeForce GTX 590
GeForce 720M	GeForce GT 625M	GeForce GTX 670M
GeForce 810M	GeForce GT 630	GeForce GTX 675M
GeForce 820M	GeForce GT 630M	GeForce GTX465
GeForce GT 415M	GeForce GT 635M	GeForce GTX470
GeForce GT 420	GeForce GT 640	GeForce GTX480
GeForce GT 420M	GeForce GT 640M LE	GeForce GTX480M
GeForce GT 425M	GeForce GT 645	M2050 GPU Module
GeForce GT 430	GeForce GT 705	M2070 GPU Computing Module
GeForce GT 435M	GeForce GT 730	M2090 GPU Computing Module
GeForce GT 440	GeForce GTS 450	Quadro 1000M
GeForce GT 445M	GeForce GTX 460	Quadro 2000
GeForce GT 520	GeForce GTX 460 SE	Quadro 3000M
GeForce GT 520M	GeForce GTX 460M	Quadro 4000
GeForce GT 520MX	GeForce GTX 470M	Quadro 4000M
GeForce GT 525M	GeForce GTX 485M	Quadro 5000
GeForce GT 530	GeForce GTX 550 Ti	Quadro 5000M
GeForce GT 540M	GeForce GTX 555	Quadro 500M
	GeForce GTX 560	
	GeForce GTX 560 SE	

Quadro 5010M
 Quadro 600
 Quadro 6000
 Quadro 7000

Quadro NVS 315
 Quadro Plex 7000
 S2050 GPU Computing
 Server

S2070 GPU Computing
 Server

67. ~~14.~~ [NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International](#), designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 28nm Kepler GPUs, including products with the part name or number GK104, GK106, GK107, GK110, and GK208 (the “28nm Kepler GPUs”). On information and belief, NVIDIA 28nm Kepler GPUs are made using TSMC’s 28nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 28nm Kepler GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

GeForce 825M
 GeForce 920M
 GeForce GT 630
 GeForce GT 635
 GeForce GT 640
 GeForce GT 640M
 GeForce GT 640M LE
 GeForce GT 645M
 GeForce GT 650M
 GeForce GT 660M
 GeForce GT 710
 GeForce GT 720
 GeForce GT 720M
 GeForce GT 730
 GeForce GT 730M
 GeForce GT 735M
 GeForce GT 740
 GeForce GT 740M
 GeForce GT 745M
 GeForce GT 750M
 GeForce GT 755M

GeForce GTX 645
 GeForce GTX 650
 GeForce GTX 650 Ti
 GeForce GTX 650 Ti
 Boost
 GeForce GTX 660
 GeForce GTX 660 Ti
 GeForce GTX 670
 GeForce GTX 680
 GeForce GTX 690
 GeForce GTX 760
 GeForce GTX 760 Ti
 GeForce GTX 760M
 GeForce GTX 765M
 GeForce GTX 770
 GeForce GTX 770M
 GeForce GTX 780
 GeForce GTX 780 Ti
 GeForce GTX 780M
 GeForce GTX 860M
 GeForce GTX 870M

GeForce GTX 880M
 GeForce GTX TITAN
 GeForce GTX TITAN
 Black
 GeForce GTX TITAN Z
 GeForce GTX 670MX
 GeForce GTX 675MX
 GeForce GTX 680M
 GeForce GTX 680MX
 GRID K1
 GRID K2
 GRID K340
 GRID K520
 K10 GPU Accelerator
 K20 GPU Accelerator
 K20X GPU Accelerator
 K40 GPU Accelerator
 Quadro 410
 Quadro K1000M
 Quadro K1100M
 Quadro K2000

Quadro K2000D	Quadro K4100M	Quadro K510M
Quadro K2000M	Quadro K420	Quadro K5200
Quadro K2100M	Quadro K4200	Quadro K600
Quadro K3000M	Quadro K5000	Quadro K6000
Quadro K3100M	Quadro K5000M	Quadro K610M
Quadro K4000	Quadro K500M	Quadro NVS 510
Quadro K4000M	Quadro K5100M	

68. ~~15.~~ [NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International](#), designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 28nm Maxwell GPUs, including products with the part name or number GM107, GM108, GM200, GM204, and GM206 (the “28nm Maxwell GPUs”). On information and belief, NVIDIA 28nm Maxwell GPUs are made using TSMC’s 28nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 28nm Maxwell GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

GeForce 840M	GeForce GTX 970	Quadro K620
GeForce 845M	GeForce GTX 970M	Quadro M1000M
GeForce 930M	GeForce GTX 980	Quadro M1200
GeForce 940M	GeForce GTX 980 Ti	Quadro M2000
GeForce GT 945A	GeForce GTX 980	Quadro M2000M
GeForce GTX 745	GeForce GTX 980M	Quadro M2200
GeForce GTX 750	GeForce GTX TITAN X	Quadro M500M
GeForce GTX 750 Ti	GeForce MX110	Quadro M520
GeForce GTX 850M	GeForce MX130	Quadro M6000
GeForce GTX 860M	M10 GPU Accelerator	Quadro M600M
GeForce GTX 950	M4 GPU Accelerator	Quadro M620
GeForce GTX 950M	M40 GPU Accelerator	Quadro NVS 810
GeForce GTX 960	Quadro K1200	Jetson Nano
GeForce GTX 960M	Quadro K2200	
GeForce GTX 965M	Quadro K2200M	

69. ~~16.~~ [NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International,](#) designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 16nm Pascal GPUs, including products with the part name or number GP100, GP102, GP104, and GP106 (the “16nm Pascal GPUs”). On information and belief, NVIDIA 16nm Pascal GPUs are made using TSMC’s 16nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 16nm Pascal GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, graphics cards and/or gaming laptops sold by Acer, ASUS, Lenovo, and MSI and the following NVIDIA products:

GeForce GTX 1060	NVIDIA TITAN X	Quadro P3200
GeForce GTX 1060 Max-Q	NVIDIA TITAN Xp	Quadro P4000
GeForce GTX 1070	P100 GPU Accelerator	Quadro P4000 Max-Q
GeForce GTX 1070 Max-Q	P4 GPU Accelerator	Quadro P4200
GeForce GTX 1070 Ti	P40 GPU Accelerator	Quadro P5000
GeForce GTX 1080	P6 GPU Accelerator	Quadro P5200
GeForce GTX 1080 Max-Q	Quadro GP100	Quadro P6000
GeForce GTX 1080 Ti	Quadro P3000	Jetson TX2

70. ~~17.~~ [NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International,](#) designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 28nm Tegra K1 SoCs, including products with the part name or number T124 and T132 (the “28nm Tegra K1 SoCs”). The 28nm Tegra K1 SoCs feature, among other things, a 28nm Kepler GPU. On information and belief, NVIDIA 28nm Tegra K1 SoCs are made using TSMC’s 28nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 28nm Tegra K1 SoCs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into

the United States, including, for example, the NVIDIA SHIELD Tablet, Acer Chromebook 13, Google Nexus 9, Lenovo ThinkVision 28, and Google Project Tango Tablet.

71. ~~18.~~ NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for 20nm Tegra X1 SoCs, including products with the part name or number T210 and NX (the “20nm Tegra X1 SoCs”). The 20nm Tegra X1 SoCs feature, among other things, a 20nm Maxwell GPU. On information and belief, NVIDIA 20nm Tegra X1 SoCs are made using TSMC’s 20nm manufacturing technology, and therefore include the same or similar structures and features. On information and belief, NVIDIA 20nm Tegra X1 SoCs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, the NVIDIA SHIELD TV, NVIDIA SHIELD Tablet, NVIDIA DRIVE CX & PX, Google Pixel C, and Nintendo Switch.

72. ~~19.~~ NVIDIA Corporation, together with its subsidiaries NVIDIA Singapore and NVIDIA International, designs, makes, uses, sells, offers for sale, and/or imports into the United States, and provides support for the Tesla GPUs, including products with the part name or number Tesla P100 and Tesla V100 that are made using TSMC’s Chip-on-Wafer-on-Substrate (“CoWoS”) technology (the “CoWoS GPUs”). On information and belief, NVIDIA CoWoS GPUs include the same or similar structures and features. On information and belief, NVIDIA CoWoS GPUs are incorporated in products that are designed, made, used, sold, offered for sale, and/or imported into the United States, including, for example, the NVIDIA DGX-1 and DGX-2 supercomputers and data center products provided by Acer, ASUSTek Computer, Cisco, Dell, Fujitsu, Google, Lenovo, Penguin Computing, and Supermicro, among others. *See, e.g.,* <https://www.nvidia.com/en-us/data-center/where-to-buy-tesla/>.

CLAIMS FOR PATENT INFRINGEMENT

73. ~~20.~~ Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through ~~19~~72 as though fully set forth herein.

74. ~~21.~~ The allegations provided below are exemplary and without prejudice to Plaintiffs' infringement contentions provided pursuant to the Court's scheduling order and local rules. In providing these allegations, Plaintiffs do not convey or imply any particular claim constructions or the precise scope of the claims. Plaintiffs' claim construction contentions regarding the meaning and scope of the claim terms will be provided under the Court's scheduling order and local rules.

COUNT I INFRINGEMENT OF U.S. PATENT NO. 6,232,231

75. ~~22.~~ Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through ~~21~~74 as though fully set forth herein.

76. ~~23.~~ On May 15, 2001, the United States Patent and Trademark Office ("USPTO") duly and legally issued the '231 patent, titled "Planarized Semiconductor Interconnect Topography and Method For Polishing a Metal Layer To Form Interconnect," naming Anantha R. Sethuraman and Christopher A. Seams as inventors. A true and correct copy of the '231 patent is attached hereto as Exhibit A.

77. ~~24.~~ Invensas owns the entire right, title, and interest in and to the '231 patent, including the right to sue and recover damages, including damages for past infringement.

78. ~~25.~~ Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

79. ~~26.~~ By at least December 2, 2014, Plaintiffs disclosed the existence of the '231 patent to NVIDIA [Corporation, NVIDIA Singapore, and NVIDIA International](#) and explained, in

the form of claim charts, how certain exemplary NVIDIA devices infringe one or more claims of the '231 patent. Thus, since at least December 2, 2014, NVIDIA ~~has~~Corporation, NVIDIA Singapore, and NVIDIA International have had knowledge of the '231 patent and that ~~its~~their activities infringe the '231 patent. In addition, since at least December 2, 2014, NVIDIA ~~has~~Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known that ~~its~~their customers, distributors, and other purchasers of the '231 Accused Products were infringing the '231 patent.

80. ~~27.~~ NVIDIA ~~has~~Corporation, NVIDIA Singapore, and NVIDIA International have infringed, directly and/or indirectly, either literally or under the doctrine of equivalents, at least claim 1 of the '231 patent in violation of at least 35 U.S.C. § 271(b) and/or (g) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '231 patent.

81. ~~28.~~ Based on the information presently available, Plaintiffs allege that NVIDIA's 40nm Fermi GPUs, 28nm Kepler GPUs, 28nm Maxwell GPUs, 16nm Pascal GPUs, 28nm Tegra K1 SoCs, and 20nm Tegra X1 SoCs are exemplary devices that infringe at least claim 1 of the '231 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'231 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to supplement and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

82. ~~29.~~ On information and belief, the '231 Accused Products meet each and every limitation of at least claim 1 of the '231 patent.

83. ~~30.~~ Claim 1 of the '231 patent recites a “method for providing a substantially planar semiconductor topography which extends above a plurality of electrically conductive features that form an integrated circuit[.]” On information and belief, the '231 Accused Products comprise a substantially planar semiconductor topography that extends above a plurality of electrically conductive features that form an integrated circuit. For example, the '231 Accused Products comprise a substantially planar layer extending over a layer below that contains a plurality of electrically conductive features that form an integrated circuit.

84. ~~31.~~ Claim 1 of the '231 patent requires “etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches[.]” On information and belief, the '231 Accused Products comprise semiconductor chips that are made by a process that includes etching a plurality of laterally spaced dummy trenches into a dielectric layer between a first trench and a series of second trenches. For example, the '231 Accused Products comprise multiple dummy trenches laterally spaced between a first interconnect and a series of second interconnects, each of which was formed in part by etching trenches into a layer of insulating material.

85. ~~32.~~ Claim 1 of the '231 patent further requires that “a lateral dimension of said first trench is greater than a lateral dimension of said second trenches[.]” On information and belief, the lateral dimension of a first trench is greater than a lateral dimension of a series of second trenches (i.e., the first trench is wider than at least one of the second trenches) in the '231 Accused Products. For example, the width of the first trench is greater than the width of one or more of the second trenches.

86. ~~33.~~ Claim 1 of the '231 patent further requires “filling said dummy trenches and said first and second trenches with a conductive material[.]” On information and belief, in the '231

Accused Products, the first, second, and dummy trenches are filled with a conductive material. For example, the first interconnect, second interconnects, and dummy connectors are formed from copper that was filled into trenches etched into the insulating layer.

87. ~~34.~~ Claim 1 of the '231 patent further requires “polishing said conductive material to form dummy conductors exclusively in said dummy trenches and interconnect exclusively in said first and second trenches[.]” On information and belief, in the '231 Accused Products, the interconnects and dummy conductors are made by a process that includes polishing the conductive material deposited in the first, second, and dummy trenches until the conductive material is exclusively in those trenches (i.e., the conductive material in the first, second, and dummy trenches has been polished such that the copper in the dummy trenches does not connect to the copper in either of the first or second trenches). For example, copper deposited in the dummy trenches has been polished so that it is separate from the copper deposited in the first and second trenches.

88. ~~35.~~ Claim 1 of the '231 patent further requires “said dummy conductors are electrically separate from said plurality of electrically conductive features and co-planar with said interconnect.” On information and belief, in the '231 Accused Products, the dummy conductors are co-planar with the interconnect and electrically separate from the plurality of electrically conductive features. For example, the upper surfaces of the interconnects are coplanar with the upper surfaces of the dummy conductors, and the dummy conductors are electrically separate from the active or passive electrical components below the dummy conductors.

89. ~~36.~~ NVIDIA ~~has~~ [Corporation, NVIDIA Singapore, and NVIDIA International have](#) imported into the United States, or offered to sell, sell, or used within the United States, the '231 Accused Products, knowing that such products are made by a process covered by at least claim 1 of the '231 patent, in violation of 35 U.S.C. § 271(g). For example, [on information and belief,](#)

NVIDIA ~~has~~ Singapore has sold '231 Accused Products and shipped them to the United States. As another example, on information and belief, [REDACTED]

[REDACTED] As another example, NVIDIA Corporation, NVIDIA Singapore, and/or NVIDIA International have offered to sell the '231

Accused Products in the United States through NVIDIA's online store,

<https://web.archive.org/web/20150506105821/http://www.geforce.com/>

hardware (archived: May 6, 2015), and, on information and belief, through domestic retailers such as Best Buy. The infringing semiconductor chips of the '231 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

90. ~~37.~~ NVIDIA ~~has~~ Corporation, NVIDIA Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 1 of the '231 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International, knowing ~~its~~ their products infringe the '231 patent and with the specific intent for others to infringe the '231 patent, ~~has~~ have actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers ("AIBs"), automotive suppliers, and retailers/distributors, to sell, offer for sale, use, and/or import into the United States, without license or authority, '231 Accused Products and/or products containing '231 Accused Products made by a process patented in the United States. For example, NVIDIA published and provided marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instructed and encouraged third parties to integrate the '231 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encouraged NVIDIA's customers to purchase and use those

products in the United States. *E.g.*,

<https://web.archive.org/web/20150506104826/http://www.geforce.com/hardware/>

[compare-buy-gpus](#) (archived: May 6, 2015); <https://web.archive.org/web/20150821070328/>

<http://www.nvidia.com/object/tegra.html> (archived: August 21, 2015). NVIDIA has also

established the “NVIDIA Partner Network” to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, <https://web.archive.org/web/20150819100649/>

<http://www.nvidia.com/object/nvidia-partner-network.html> (archived: August 19, 2015).

Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs in the United States, or import them into the United States.

These activities were designed to bring NVIDIA’s infringing products to market in the United States.

91. ~~38.~~ Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA’s infringement of the ’231 patent, including, without limitation, not less than a reasonable royalty.

92. ~~39.~~ NVIDIA’s infringement of the ’231 patent has been willful and deliberate, entitling Plaintiffs to enhanced damages and attorneys’ fees.

COUNT II **INFRINGEMENT OF U.S. PATENT NO. 6,849,946**

93. ~~40.~~ Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through ~~39~~92 as though fully set forth herein.

94. ~~41.~~ On February 1, 2005, the USPTO duly and legally issued the ’946 patent, titled “Planarized Semiconductor Interconnect Topography and Method For Polishing a Metal Layer To

Form Interconnect,” naming Anantha R. Sethuraman and Christopher A. Seams as inventors. A true and correct copy of the ’946 patent is attached hereto as Exhibit B.

95. ~~42.~~ Invensas owns the entire right, title, and interest in and to the ’946 patent, including the right to sue and recover damages, including damages for past infringement.

96. ~~43.~~ Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

97. ~~44.~~ By at least December 2, 2014, Plaintiffs disclosed the existence of the ’946 patent to NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International and explained, in the form of claim charts, how certain exemplary NVIDIA devices infringe one or more claims of the ’946 patent. Thus, since at least December 2, 2014, NVIDIA ~~has~~ Corporation, NVIDIA Singapore, and/or NVIDIA International have had knowledge of the ’946 patent and that ~~its~~ their activities infringe the ’946 patent. In addition, since at least December 2, 2014, NVIDIA ~~has~~ Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known that ~~its~~ their customers, distributors, and other purchasers of the ’946 Accused Products were infringing the ’946 patent.

98. ~~45.~~ NVIDIA ~~has~~ Corporation, NVIDIA Singapore, and NVIDIA International have infringed, directly and/or indirectly, either literally or under the doctrine of equivalents, at least claim 16 of the ’946 patent in violation of at least 35 U.S.C. § 271(a) and/or (b) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the ’946 patent.

99. ~~46.~~ Based on the information presently available to it, Plaintiffs allege that NVIDIA’s 40nm Fermi GPUs, 28nm Kepler GPUs, 28nm Maxwell GPUs, 16nm Pascal GPUs, 28nm Tegra K1 SoCs, and 20nm Tegra X1 SoCs are exemplary devices that infringe at least claim

16 of the '946 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'946 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to augment, supplement, and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

100. ~~47.~~ Claim 16 of the '946 patent recites "[a] substantially planar semiconductor topography[.]" On information and belief, the '946 Accused Products comprise a substantially planar semiconductor topography. For example, the upper surfaces of the first trench, plurality of laterally spaced dummy trenches, series of second trenches, and the dielectric layer are substantially planar.

101. ~~48.~~ Claim 16 of the '946 patent requires "a plurality of laterally spaced dummy trenches in a dielectric layer, between a first trench and a series of second trenches[.]" On information and belief, the '946 Accused Products comprise a plurality of laterally spaced dummy trenches in a dielectric layer between a first trench and a series of second trenches. For example, there are multiple laterally spaced dummy trenches in insulating material that are between a first relatively wide trench and a series of second relatively narrow trenches.

102. ~~49.~~ Claim 16 of the '946 patent further requires that "each of the second trenches is relatively narrow compared to the first trench" and "a lateral dimension of at least one of the laterally spaced dummy trenches is less than a lateral dimension of the first trench and greater than a lateral dimension of at least one of the series of second trenches[.]" On information and belief, the second trenches in the '946 Accused Products are relatively narrow compared to the first trench (i.e., each of the relatively narrow trenches is narrower than the relatively wide trench), and a

lateral dimension of at least one of the laterally spaced dummy trenches is less than a lateral dimension of the first trench and greater than a lateral dimension of at least one of the series of second trenches. For example, the width of one or more of the dummy trenches is less than the width of the relatively wide trench, and greater than the width of one or more of the relatively narrow trenches.

103. ~~50.~~ Claim 16 of the '946 patent further requires “dummy conductors in said laterally spaced dummy trenches and electrically separate from electrically conductive features below said dummy conductors[.]” On information and belief, in the '946 Accused Products, dummy conductors in the laterally spaced dummy trenches are electrically separate from electrically conductive features below the dummy conductors. For example, the copper-based dummy conductors in the dummy trenches are electrically separate from the copper-based conductive lines in the first trench and the series of second trenches, and from active or passive electrical components below the dummy conductors.

104. ~~51.~~ Claim 16 of the '946 patent further requires “conductive lines in said series of second trenches and said first trench, wherein upper surfaces of said conductive lines are substantially coplanar with dummy conductor upper surfaces.” On information and belief, the upper surfaces of the conductive lines in the '946 Accused Products are substantially coplanar with the dummy conductor upper surfaces. For example, the upper surfaces of the copper-based interconnects are substantially coplanar with the upper surfaces of the dummy conductors.

105. ~~52.~~ NVIDIA ~~has~~ Corporation, NVIDIA Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 16 of the '946 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International, knowing ~~its~~ their products infringe the '946 patent and with

the specific intent for others to infringe the '946 patent, ~~has~~have actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers ("AIBs"), and retailers/distributors, to sell, offer for sale, use, and/or import into the United States, without license or authority, '946 Accused Products and/or products containing '946 Accused Products. For example, NVIDIA published and provided marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instructed and encouraged third parties to integrate the '946 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encouraged NVIDIA's customers to purchase and use those products in the United States. *E.g.*, <https://web.archive.org/web/20150506104826/http://www.geforce.com/hardware/compare-buy-gpus> (archived: May 6, 2015); <https://web.archive.org/web/20150821070328/http://www.nvidia.com/object/tegra.html> (archived: August 21, 2015). NVIDIA has also established the "NVIDIA Partner Network" to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, <https://web.archive.org/web/20150819100649/http://www.nvidia.com/object/nvidia-partner-network.html> (archived: August 19, 2015). Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs in the United States, or import them into the United States. These activities were designed to bring NVIDIA's infringing products to market in the United States.

106. ~~53.~~ Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '946 patent, including, without limitation, not less than a reasonable royalty.

107. ~~54.~~ NVIDIA's infringement of the '946 patent has been willful and deliberate, entitling Plaintiffs to enhanced damages and attorneys' fees.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 7,064,005

108. ~~55.~~ Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through ~~54~~107 as though fully set forth herein.

109. ~~56.~~ On June 20, 2006, the USPTO duly and legally issued the '005 patent, titled "Semiconductor Apparatus and Method of Manufacturing Same," naming Yuji Takaoka as the inventor. A true and correct copy of the '005 patent is attached hereto as Exhibit C.

110. ~~57.~~ Tessera Advanced Technologies, Inc. owns the entire right, title, and interest in and to the '005 patent, including the right to sue and recover damages, including damages for past infringement.

111. ~~58.~~ Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

112. ~~59.~~ Since at least the filing of this Complaint, NVIDIA ~~has~~Corporation, NVIDIA Singapore, and NVIDIA International have had knowledge of the '005 patent and that ~~its~~their activities infringe the '005 patent. In addition, since at least the filing of this Complaint, NVIDIA ~~has~~Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known that ~~its~~their customers, distributors, and other purchasers of the '005 Accused Products are infringing the '005 patent.

113. ~~60.~~ NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have infringed, either literally or under the doctrine of equivalents, at least claim 1 of the '005 patent in violation of at least 35 U.S.C. § 271(b) and/or (g) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '005 patent.

114. ~~61.~~ Based on the information presently available to it, Plaintiffs allege that NVIDIA's CoWoS GPUs, including the Tesla P100 and Tesla V100, are exemplary devices that infringe at least claim 1 of the '005 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'005 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to augment, supplement, and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

115. ~~62.~~ Claim 1 of the '005 patent recites a "method of manufacturing a semiconductor apparatus constituting a multichip module wherein a plurality of device chips are flip-chip mounted on an interposer substrate[.]" On information and belief, the '005 Accused Products comprise a semiconductor apparatus constituting a multichip module wherein a plurality of device chips are flip-chip mounted on an interposer substrate. For example, the '005 Accused Products comprise a passive silicon interposer with a GP100 chip and four memory stacks, each including a base die, flip-chip mounted on the interposer.

116. ~~63.~~ Claim 1 of the '005 patent requires "a first step for forming an embedded electrode by filling a contact hall penetrating through a wafer with conductor, said wafer being a base material of said interposer substrate[.]" On information and belief, the '005 Accused Products

comprise an embedded electrode that was formed by filling a contact hall penetrating through a wafer with conductor, said wafer being a base material of said interposer substrate. For example, the '005 Accused Products comprise a passive silicon interposer that includes embedded electrodes passing through it. The passive silicon interposer was created from a wafer of silicon, the base material of the interposer substrate.

117. ~~64.~~ Claim 1 of the '005 patent further requires “a second step for forming wiring including a connection electrode connected to a first end of the embedded electrode and a connection electrode on which said device chips to be flip-chip mounted on a surface of said wafer[.]” On information and belief, the '005 Accused Products comprise wiring including a connection electrode connected to a first end of the embedded electrode and a connection electrode on which said device chips to be flip-chip mounted on a surface of said wafer. For example, the '005 Accused Products comprise a passive silicon interposer that has wiring including a connection electrode on its upper surface (in the finished part) connected to an embedded electrode. The device chips are flip-chip mounted on the connection electrode.

118. ~~65.~~ Claim 1 of the '005 patent further requires “a third step for forming said interposer substrate by grinding and polishing a back surface of said wafer until a second end of said embedded electrode is exposed after said plurality of device chips are flip-chip mounted on said connection electrode formed in the second step[.]” On information and belief, the '005 Accused Products comprise an interposer substrate formed by grinding and polishing a back surface of said wafer until a second end of said embedded electrode is exposed after said plurality of device chips are flip-chip mounted on said connection electrode formed in the second step. For example, the '005 Accused Products comprise a passive silicon interposer that has been formed by

grinding and polishing the lower surface (in the finished part) in order to expose the second end of the embedded electrode.

119. ~~66.~~ Claim 1 of the '005 patent further requires "a fourth step for providing a bump electrode on the second end of said embedded electrode exposed in the third step[.]" On information and belief, the '005 Accused Products comprise a bump electrode provided on the second end of said embedded electrode exposed by grinding and polishing. For example, the '005 Accused Products comprise a bump electrode on the end of the embedded electrode exposed on the lower surface (in the finished part) of the passive silicon interposer.

120. ~~67.~~ NVIDIA ~~has~~ Corporation, NVIDIA Singapore, and NVIDIA International have imported into the United States, or offered to sell, sell, or used within the United States, the '005 Accused Products, knowing that such products are made by a process covered by at least claim 1 of the '005 patent, in violation of 35 U.S.C. § 271(g). For example, on information and belief, NVIDIA ~~has~~ Singapore has sold '005 Accused Products and shipped them to the United States. As
another example, on information and belief, [REDACTED]
 [REDACTED] . As another example, NVIDIA
Corporation, NVIDIA Singapore, and/or NVIDIA International have offered to sell the '005 Accused Products in the United States through NVIDIA's website, <https://www.nvidia.com/en-us/data-center/dgx-1> ("Order NVIDIA DGX Today"). The infringing semiconductor chips of the '005 Accused Products are neither materially changed by subsequent processes nor become trivial and nonessential components of another product.

121. ~~68.~~ Since at least the filing of this Complaint, NVIDIA ~~has~~ Corporation, NVIDIA
Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 1 of the '005 patent in violation of 35 U.S.C. § 271(b). On

information and belief, NVIDIA [Corporation, NVIDIA Singapore, and NVIDIA International](#), knowing ~~its~~[their](#) products infringe the '005 patent and with the specific intent for others to infringe the '005 patent, ~~has~~[have](#) actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers ("AIBs"), automotive suppliers, and retailers/distributors, to sell, offer for sale, use, and/or import into the United States, without license or authority, '005 Accused Products and/or products containing '005 Accused Products made by a process patented in the United States. For example, NVIDIA publishes and provides marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (~~http://www~~<http://www.nvidia.com/>) that instruct and encourage third parties to integrate the '005 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encourage NVIDIA's customers to purchase and use those products in the United States. *E.g.*, <https://www.nvidia.com/en-us/data-center/tesla-p100/>; <https://www.nvidia.com/en-us/data-center/tesla-v100/>. NVIDIA has also established the "NVIDIA Partner Network" to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, <https://www.nvidia.com/en-us/about-nvidia/partners/>. [Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs in the United States, or import them into the United States.](#) These activities are designed to bring NVIDIA's infringing products to market in the United States.

122. ~~69.~~ Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '005 patent, including, without limitation, not less than a reasonable royalty.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 6,317,333

123. ~~70.~~ Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through ~~69~~122 as though fully set forth herein.

124. ~~71.~~ On November 13, 2001, the USPTO duly and legally issued the '333 patent, titled "Package Construction of Semiconductor Device," naming Shinji Baba as the inventor. A true and correct copy of the '333 patent is attached hereto as Exhibit D.

125. ~~72.~~ Tessera Advanced Technologies, Inc. owns the entire right, title, and interest in and to the '333 patent, including the right to sue and recover damages, including damages for past infringement.

126. ~~73.~~ Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.

127. ~~74.~~ By at least October 13, 2014, Plaintiffs disclosed the existence of the '333 patent to NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International and explained, in the form of claim charts, how certain exemplary NVIDIA devices infringe one or more claims of the '333 patent. Thus, since at least October 13, 2014, NVIDIA ~~has~~Corporation, NVIDIA Singapore, and NVIDIA International have had knowledge of the '333 patent and that ~~its~~their activities infringe the '333 patent. In addition, since at least October 13, 2014, NVIDIA ~~has~~Corporation, NVIDIA Singapore, and NVIDIA International have known or should have known that ~~its~~their customers, distributors, and other purchasers of the '333 Accused Products were infringing the '333 patent.

128. ~~75.~~ NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International have infringed, directly and/or indirectly, either literally or under the doctrine of equivalents, at least claim 1 of the '333 patent in violation of at least 35 U.S.C. § 271(a) and/or (b) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '333 patent.

129. ~~76.~~ Based on the information presently available to it, Plaintiffs allege that NVIDIA's Tesla K10 Server Accelerator Card and Grid K2 Graphics Card, and MSI's GeForce GTX 750 Ti Graphics Card devices, are exemplary devices that infringe at least claim 1 of the '333 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'333 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to augment, supplement, and revise this identification of infringing products based on additional information obtained through discovery or otherwise.

130. ~~77.~~ Claim 1 of the '333 patent requires "a ball grid array (BGA) substrate including an upper insulating layer comprising a plurality of laminated layers, an intermediate insulating layer, and a lower insulating layer comprising a plurality of laminated insulating layers[.]" On information and belief, the '333 Accused Products comprise a BGA substrate including an upper insulating layer comprising a plurality of laminated layers, an intermediate insulating layer, and a lower insulating layer comprising a plurality of laminated insulating layers. For example, the '333 Accused Products comprise a GPU semiconductor device in a BGA substrate package, wherein the BGA substrate includes an insulating core layer and upper and lower insulating layers, wherein each of the upper and lower insulating layers includes multiple laminated layers.

131. ~~78.~~ Claim 1 of the '333 patent further requires “a plurality of lines on top surfaces of the insulating layers included in each of the upper, intermediate, and lower layers, respectively[.]” On information and belief, the '333 Accused Products comprise a plurality of lines on top surfaces of the insulating layers included in each of the upper, intermediate, and lower layers, respectively. For example, the '333 Accused Products comprise multiple interconnect traces located on the top surfaces of each of the upper insulating layer, intermediate core layer, and lower insulating layer.

132. ~~79.~~ Claim 1 of the '333 patent further requires “a plurality of solder balls disposed on an outermost surface of the lower insulating layer[.]” On information and belief, the '333 Accused Products comprise a plurality of solder balls disposed on an outermost surface of the lower insulating layer. For example, the '333 Accused Products comprise BGA solder balls arranged on a bottom surface of the lower insulating layer, which are used for soldering when mounting the package to a circuit board.

133. ~~80.~~ Claim 1 of the '333 patent further requires “a semiconductor chip having a plurality of electrodes connected to respective lines, the semiconductor chip being connected electrically to the plurality of solder balls through a plurality of via holes in each of the upper, lower, and intermediate insulating layers[.]” On information and belief, the '333 Accused Products comprise a semiconductor chip having a plurality of electrodes connected to respective lines, the semiconductor chip being connected electrically to the plurality of solder balls through a plurality of via holes in each of the upper, lower, and intermediate insulating layers. For example, the '333 Accused Products comprise a GPU semiconductor chip having a plurality of flip-chip solder bumps connected to interconnect traces, the semiconductor chip being electrically connected to the

BGA solder balls through vias formed in each of the upper insulating layer, intermediate core layer, and lower insulating layer.

134. ~~81.~~ Claim 1 of the '333 patent further recites that “the intermediate insulating layer is a material having thermal expansion characteristics substantially matching thermal expansion characteristics of a circuit board, the semiconductor device being mounted on the circuit board, and the upper and lower insulating layers have thermal expansion characteristics different from but similar to that of the intermediate insulating layer so that interlayer peeling of the BGA substrate is prevented[.]” On information and belief, the '333 Accused Products comprise an intermediate insulating layer that is a material having thermal expansion characteristics substantially matching thermal expansion characteristics of a circuit board, the semiconductor device being mounted on the circuit board, and the upper and lower insulating layers having thermal expansion characteristics different from but similar to that of the intermediate insulating layer so that interlayer peeling of the BGA substrate is prevented. For example, the coefficient of thermal expansion (“CTE”) of the intermediate core layer substantially matches the CTE of the circuit board to which the semiconductor device is mounted, and the CTEs of the upper and lower build-up layers is different from but similar to the CTE of the intermediate core layer, which prevents interlayer peeling of the substrate.

135. ~~82.~~ NVIDIA ~~has~~ Corporation, NVIDIA Singapore, and NVIDIA International have actively, knowingly, and intentionally induced infringement of at least claim 1 of the '333 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA Corporation, NVIDIA Singapore, and NVIDIA International, knowing ~~its~~ their products infringe the '333 patent and with the specific intent for others to infringe the '333 patent, ~~has~~ have actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers (“AIBs”), and

retailers/distributors, to make, have made, use, sell, offer for sale, and/or import into the United States, without license or authority, '333 Accused Products and/or products containing '333 Accused Products. For example, NVIDIA published and provided marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instructed and encouraged third parties to integrate the '333 Accused Products into products sold, offered for sale, used, and/or imported into the United States and encouraged NVIDIA's customers to purchase and use those products in the United States.

E.g., [http://web.archive.org/web/](http://web.archive.org/web/20150910180943/http://www.nvidia.com/object/grid-enterprise-resources.html#datasheets)

[20150910180943/http://www.nvidia.com/object/grid-enterprise-resources.html#datasheets](http://web.archive.org/web/20150910180943/http://www.nvidia.com/object/grid-enterprise-resources.html#datasheets)

(archived: Sept. 10, 2015); [http://web.archive.org/web/20150907121006/http://www.nvidia.com/](http://web.archive.org/web/20150907121006/http://www.nvidia.com/object/tesla-supercomputing-solutions.html)

[object/tesla-supercomputing-solutions.html](http://web.archive.org/web/20150907121006/http://www.nvidia.com/object/tesla-supercomputing-solutions.html) (archived: Sept. 7, 2015). NVIDIA has also

established the "NVIDIA Partner Network" to assist customers with marketing, training, sales and distribution, and service and support. *E.g.*, [https://web.archive.org/web/20150819100649/](https://web.archive.org/web/20150819100649/http://www.nvidia.com/object/nvidia-partner-network.html)

[http://www.nvidia.com/object/nvidia-partner-network.html](https://web.archive.org/web/20150819100649/http://www.nvidia.com/object/nvidia-partner-network.html) (archived: August 19, 2015).

Furthermore, on information and belief, NVIDIA Singapore has acted as an agent for NVIDIA Corporation in the sale of infringing NVIDIA GPUs to third-party AIBs such as ASUSTeK with the knowledge that such AIBs, including ASUSTeK and its affiliates, would then use, sell, or offer for sale the infringing NVIDIA GPUs in the United States, or import them into the United States.

These activities were designed to bring NVIDIA's infringing products to market in the United States.

136. ~~83.~~ Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '333 patent, including, without limitation, not less than a reasonable royalty.

137. ~~84.~~ NVIDIA's infringement of the '333 patent has been willful and deliberate, entitling Plaintiffs to enhanced damages and attorneys' fees.

~~COUNT V~~
~~INFRINGEMENT OF U.S. PATENT NO. 5,666,046~~

~~85.——Plaintiffs incorporate by reference the allegations set forth in paragraphs 1 through 84 as though fully set forth herein.~~

~~86.——On September 9, 1997, the USPTO duly and legally issued the '046 patent, titled "Reference Voltage Circuit Having a Substantially Zero Temperature Coefficient," naming David Mietus as the inventor. A true and correct copy of the '046 patent is attached hereto as Exhibit E.~~

~~87.——Tessera Advanced Technologies, Inc. owns the entire right, title, and interest in and to the '046 patent, including the right to sue and recover damages, including damages for past infringement.~~

~~88.——Plaintiffs have complied with applicable requirements of 35 U.S.C. § 287(a), which entitles Plaintiffs to receive damages for past infringement.~~

~~89.——By at least February 11, 2015, Plaintiffs disclosed the existence of the '046 patent to NVIDIA and explained, in the form of claim charts, how certain exemplary NVIDIA devices infringe one or more claims of the '046 patent. Thus, since at least February 11, 2015, NVIDIA has had knowledge of the '046 patent and that its activities infringe the '046 patent. In addition, since at least February 11, 2015, NVIDIA has known or should have known that its customers, distributors, and other purchasers of the '046 Accused Products were infringing the '046 patent.~~

~~90.——NVIDIA has infringed, directly and/or indirectly, either literally or under the doctrine of equivalents, at least claim 20 of the '046 patent in violation of at least 35 U.S.C. § 271(a) and/or (b) by making, having made, using, selling, offering for sale, and/or importing into the United States products that infringe the '046 patent.~~

91. ~~Based on the information presently available to it, Plaintiffs allege that NVIDIA's Kepler GK107 GPU and Tegra 3 devices are exemplary devices that infringe at least claim 20 of the '046 patent. The infringing products identified in this paragraph, all NVIDIA products that are substantially similar to these products, and products containing the same are referred to collectively as the "'046 Accused Products." Plaintiffs make this preliminary identification of infringing products and infringed claims without the benefit of discovery or claim construction in this action, and expressly reserve the right to augment, supplement, and revise this identification of infringing products based on additional information obtained through discovery or otherwise.~~

92. ~~Claim 20 of the '046 patent requires "a method for generating an output voltage having a substantially zero temperature coefficient[.]" On information and belief, the '046 Accused Products comprise a method for generating an output voltage having a substantially zero temperature coefficient.~~

93. ~~Claim 20 of the '046 patent requires "generating a first current having a positive temperature coefficient in accordance with a voltage difference across a set of p-n junctions[.]" On information and belief, the '046 Accused Products comprise generating a first current having a positive temperature coefficient in accordance with a voltage difference across a set of p-n junctions. For example, the '046 Accused Products comprise a first current generation circuit using two p-n junctions having different areas to generate a current having a positive temperature coefficient.~~

94. ~~Claim 20 of the '046 patent requires "generating a second current having a negative temperature coefficient in accordance with a voltage across a p-n junction of the set of p-n junctions[.]" On information and belief, the '046 Accused Products comprise generating a second current having a negative temperature coefficient in accordance with a voltage across a p-n~~

~~junction of the set of p-n junctions. For example, the '046 Accused Products comprise a second current generation circuit that uses one of the p-n junctions from the first current generation circuit to generate a current having a negative temperature coefficient.~~

~~95.——Claim 20 of the '046 patent requires “summing the first and second currents to provide an output current having a substantially zero temperature coefficient[.]” On information and belief, the '046 Accused Products comprise summing the first and second currents to provide an output current having a substantially zero temperature coefficient. For example, the two currents generated in the '046 Accused Products flow into a common node (are summed together) to generate an output current that has a substantially zero temperature coefficient.~~

~~96.——Claim 20 of the '046 patent requires “using the output current to generate the output voltage.” On information and belief, the '046 Accused Products comprise using the output current to generate the output voltage. For example, the output current in the '046 Accused Products flows through resistors to generate the output voltage.~~

~~97.——NVIDIA has actively, knowingly, and intentionally induced infringement of at least claim 20 of the '046 patent in violation of 35 U.S.C. § 271(b). On information and belief, NVIDIA, knowing its products infringe the '046 patent and with the specific intent for others to infringe the '046 patent, actively encouraged third parties, including OEMs, ODMs, system builders, add-in board manufacturers (“AIBs”), and retailers/distributors, to make, have made, use, sell, offer for sale, and/or import into the United States, without license or authority, '046 Accused Products and/or products containing '046 Accused Products. For example, NVIDIA published and provided marketing materials, technical specifications, datasheets, user manuals, and development and testing resources on its website (<http://www.nvidia.com/>) that instructed and encouraged third parties to integrate the '046 Accused Products into products sold, offered for sale, used, and/or~~

~~imported into the United States and encouraged NVIDIA's customers to purchase and use those products in the United States. E.g., <https://web.archive.org/web/20150301012331/http://www.nvidia.com/object/tegra-3-processor.html> (archived: March 1, 2015); <https://web.archive.org/web/20150224072906/http://www.geforce.com/hardware/desktop-gpus/geforce-gtx-650> (archived: Feb. 24, 2015). NVIDIA also established the "NVIDIA Partner Network" to assist customers with marketing, training, sales and distribution, and service and support. E.g., <https://web.archive.org/web/20150228130644/http://www.nvidia.com/object/nvidia-partner-network.html> (archived: Feb. 28, 2015). These activities were designed to bring NVIDIA's infringing products to market in the United States.~~

~~98. Plaintiffs are entitled to recover from NVIDIA all damages that Plaintiffs have sustained as a result of NVIDIA's infringement of the '046 patent, including, without limitation, not less than a reasonable royalty.~~

~~99. NVIDIA's infringement of the '046 patent has been willful and deliberate, entitling Plaintiffs to enhanced damages and attorneys' fees.~~

JURY DEMAND

~~100.~~ 138. Plaintiffs demand a jury trial as to all issues that are triable by a jury in this action.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs respectfully pray for relief as follows:

- (a) Judgment that NVIDIA ~~is~~ Corporation, NVIDIA Singapore, and NVIDIA International are liable for infringement and/or inducing infringement of one or more claims of the Asserted Patents;
- (b) Compensatory damages in an amount according to proof, and in any event no less than a reasonable royalty;

- (c) Treble damages for willful infringement pursuant to 35 U.S.C. § 284;
- (d) Pre-judgment interest;
- (e) Post-judgment interest;
- (f) Attorneys' fees based on this being an exceptional case pursuant to 35 U.S.C. § 285, including pre-judgment interest on such fees;
- (g) An accounting and/or supplemental damages for all damages occurring after any discovery cutoff and through final judgment;
- (h) Costs and expenses; and
- (i) Any and all other relief that the Court deems just and proper.

Dated: ~~May 8, 2019~~ , 2020

Respectfully submitted,

FARNAN LLP

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Exhibit 3

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

INVENSAS CORPORATION and TESSERA)	
ADVANCED TECHNOLOGIES, INC.,)	
)	
Plaintiffs,	)	Case No. 19-cv-861-RGA
)	
v.)	
	)	JURY TRIAL DEMANDED
NVIDIA CORPORATION,)	
)	
Defendant.)	

**PLAINTIFFS’ FIRST SET OF REQUESTS FOR PRODUCTION OF
DOCUMENTS AND THINGS TO NVIDIA CORPORATION
(Nos. 1–114)**

Pursuant to Rules 26 and 34 of the Federal Rules of Civil Procedure, Invensas Corporation and Tessera Advanced Technologies, Inc. (collectively, “Plaintiffs”) hereby serve on Defendant NVIDIA Corporation the following requests to produce documents and things in accordance with the following instructions and definitions, at the offices of Covington & Burling LLP, 415 Mission Street, Ste. 5400, San Francisco, CA 94105, or at such other location as may be mutually agreed to by counsel, within 30 days from the date of service of these requests.

DEFINITIONS

1. The terms “NVIDIA,” “you,” “your,” and “Defendant” mean NVIDIA Corporation and all predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, or other persons that are acting or have acted on behalf of NVIDIA.

2. The term “Plaintiffs” means Invensas Corporation and Tessera Advanced Technologies, Inc., including without limitation all predecessors, successors, parents,

subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, or other persons that are acting or have acted on behalf of Invensas Corporation and Tessera Advanced Technologies, Inc.

3. The term “’231 Patent” means U.S. Patent No. 6,232,231.

4. The term “’946 Patent” means U.S. Patent No. 6,849,946.

5. The term “’005 Patent” means U.S. Patent No. 7,064,005.

6. The term “’333 Patent” means U.S. Patent No. 6,317,333.

7. The term “’046 Patent” means U.S. Patent No. 5,666,046.

8. The term “Asserted Patents” means the ’231 Patent, the ’946 Patent, the ’005 Patent, the ’333 Patent, and the ’046 Patent.

9. The term “Asserted Claim” means any and all claims of the Asserted Patents that have been or are asserted against NVIDIA in this action, including without limitation any claim identified in the complaint in this action or any disclosure of asserted claims and infringement contentions.

10. The term “prior art,” for purposes of these requests, means all things, patents, publications, disclosures, sales, or other acts or occurrences included within the broadest meaning of 35 U.S.C. § 102 (or any subpart thereof) and 35 U.S.C. § 103, and all things, patents, publications, disclosures, sales, or other acts or occurrences that any person or entity has identified as “prior art” or relevant to the invalidity of the patent(s) identified in the relevant request.

11. The terms “’231/’946 Accused Product” and “’231/’946 Accused Products” refer to any product comprising an NVIDIA graphics processing unit (“GPU”) or system-on-chip (“SoC”) that was fabricated for NVIDIA using TSMC’s 40nm, 28nm, 20nm, or 16nm

technology node and that was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and August 31, 2018, whether or not incorporated into a Downstream Product. The terms “‘231/’946 Accused Product” and “‘231/’946 Accused Products” encompass, without limitation, (1) NVIDIA GPUs with the part name or number GF100, GF104, GF106, GF108, GF110, GF114, GF116, GF117, GF118, GF119 (the “40nm Fermi GPUs”); (2) NVIDIA GPUs with the part name or number GK104, GK106, GK107, GK110, GK208 (the “28nm Kepler GPUs”); (3) NVIDIA GPUs with the part name or number GM107, GM108, GM200, GM204, GM206 (the “28nm Maxwell GPUs”); (4) NVIDIA GPUs with the part name or number GP100, GP102, GP104, GP 106 (the “16nm Pascal GPUs”); (5) NVIDIA SoCs with the part name or number T124 and T132 (the “28nm Tegra K1 SoCs”); (6) NVIDIA SoCs with the part name or number T210 and NX (the “20nm Tegra X1 SoCs”); and (7) the following NVIDIA Downstream Products:

C2070 GPU Computing Module	GeForce GT 430	GeForce GT 640
C2075 GPU Computing Module	GeForce GT 435M	GeForce GT 640M
GeForce 410M	GeForce GT 440	GeForce GT 640M LE
GeForce 510	GeForce GT 445M	GeForce GT 645
GeForce 605	GeForce GT 520	GeForce GT 645M
GeForce 610M	GeForce GT 520M	GeForce GT 650M
GeForce 710M	GeForce GT 520MX	GeForce GT 660M
GeForce 720M	GeForce GT 525M	GeForce GT 705
GeForce 810M	GeForce GT 530	GeForce GT 710
GeForce 820M	GeForce GT 540M	GeForce GT 720
GeForce 825M	GeForce GT 545	GeForce GT 720M
GeForce 840M	GeForce GT 550M	GeForce GT 730
GeForce 845M	GeForce GT 555M	GeForce GT 730M
GeForce 920M	GeForce GT 610	GeForce GT 735M
GeForce 930M	GeForce GT 620	GeForce GT 740
GeForce 940M	GeForce GT 620M	GeForce GT 740M
GeForce GT 415M	GeForce GT 625	GeForce GT 745M
GeForce GT 420	GeForce GT 625M	GeForce GT 750M
GeForce GT 420M	GeForce GT 630	GeForce GT 755M
GeForce GT 425M	GeForce GT 630M	GeForce GT 945A
	GeForce GT 635	GeForce GTS 450
	GeForce GT 635M	GeForce GTX 460

GeForce GTX 460 SE	GeForce GTX 960M	Quadro 5000
GeForce GTX 460M	GeForce GTX 965M	Quadro 5000M
GeForce GTX 470M	GeForce GTX 970	Quadro 500M
GeForce GTX 485M	GeForce GTX 970M	Quadro 5010M
GeForce GTX 550 Ti	GeForce GTX 980	Quadro 600
GeForce GTX 555	GeForce GTX 980 Ti	Quadro 6000
GeForce GTX 560	GeForce GTX 980	Quadro 7000
GeForce GTX 560 SE	GeForce GTX 980M	Quadro K1000M
GeForce GTX 560 Ti	GeForce GTX TITAN	Quadro K1100M
GeForce GTX 560M	GeForce GTX TITAN	Quadro K1200
GeForce GTX 570	Black	Quadro K2000
GeForce GTX 570M	GeForce GTX TITAN X	Quadro K2000D
GeForce GTX 580	GeForce GTX TITAN Z	Quadro K2000M
GeForce GTX 580M	GeForce GTX 670MX	Quadro K2100M
GeForce GTX 590	GeForce GTX 675MX	Quadro K2200
GeForce GTX 645	GeForce GTX 680M	Quadro K2200M
GeForce GTX 650	GeForce GTX 680MX	Quadro K3000M
GeForce GTX 650 Ti	GeForce GTX465	Quadro K3100M
GeForce GTX 650 Ti	GeForce GTX470	Quadro K4000
Boost	GeForce GTX480	Quadro K4000M
GeForce GTX 660	GeForce GTX480M	Quadro K4100M
GeForce GTX 660 Ti	GeForce MX110	Quadro K420
GeForce GTX 670	GeForce MX130	Quadro K4200
GeForce GTX 670M	GRID K1	Quadro K5000
GeForce GTX 675M	GRID K2	Quadro K5000M
GeForce GTX 680	GRID K340	Quadro K500M
GeForce GTX 690	GRID K520	Quadro K5100M
GeForce GTX 745	Jetson Nano	Quadro K510M
GeForce GTX 750	K10 GPU Accelerator	Quadro K5200
GeForce GTX 750 Ti	K20 GPU Accelerator	Quadro K600
GeForce GTX 760	K20X GPU Accelerator	Quadro K6000
GeForce GTX 760 Ti	K40 GPU Accelerator	Quadro K610M
GeForce GTX 760M	M10 GPU Accelerator	Quadro K620
GeForce GTX 765M	M2050 GPU Module	Quadro M1000M
GeForce GTX 770	M2070 GPU Computing	Quadro M1200
GeForce GTX 770M	Module	Quadro M2000
GeForce GTX 780	M2090 GPU Computing	Quadro M2000M
GeForce GTX 780 Ti	Module	Quadro M2200
GeForce GTX 780M	M4 GPU Accelerator	Quadro M500M
GeForce GTX 850M	M40 GPU Accelerator	Quadro M520
GeForce GTX 860M	Quadro 1000M	Quadro M6000
GeForce GTX 870M	Quadro 2000	Quadro M600M
GeForce GTX 880M	Quadro 3000M	Quadro M620
GeForce GTX 950	Quadro 4000	Quadro NVS 315
GeForce GTX 950M	Quadro 4000M	Quadro NVS 510
GeForce GTX 960	Quadro 410	Quadro NVS 810

Quadro Plex 7000

S2050 GPU Computing
ServerS2070 GPU Computing
Server

12. The terms “’005 Accused Product” and “’005 Accused Products” refer to any NVIDIA product that is or was manufactured using TSMC’s Chip-on-Wafer-on-Substrate (“CoWoS”) technology, or any substantially similar manufacturing process wherein multiple die (e.g., processor and memory) are delivered in a single package, and that is or was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and the date of trial in this action, whether or not incorporated into a Downstream Product. The terms “’005 Accused Product” and “’005 Accused Products” encompass, without limitation, the Tesla P100, Tesla V100, any other NVIDIA product built using NVIDIA’s Pascal or Volta architectures, and any Downstream Product that contains one or more of the preceding, including those identified at: <https://www.nvidia.com/en-us/data-center/where-to-buy-tesla/>.

13. The terms “’333 Accused Product” and “’333 Accused Products” refer to any product comprising an NVIDIA semiconductor device in a ball grid array (BGA) substrate package mounted to a circuit board, and where the product was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and April 16, 2018, whether or not incorporated into a Downstream Product. The terms “’333 Accused Product” and “’333 Accused Products” encompass, without limitation, the Tesla K10 Server Accelerator Card, the Grid K2 Graphics Card, and MSI’s GeForce GTX 750 Ti.

14. The terms “’046 Accused Product” and “’046 Accused Products” refer to any NVIDIA product comprising a semiconductor device that includes a reference voltage circuit and was fabricated for NVIDIA using TSMC’s 40nm, 28nm, 20nm, or 16nm technology node, where

the product was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and August 24, 2015, whether or not incorporated into a Downstream Product. The terms “’046 Accused Product” and “’046 Accused Products” encompass, without limitation, the Kepler GK107 GPU and Tegra 3 SoC.

15. The terms “NVIDIA Accused Product” and “NVIDIA Accused Products” mean, collectively, the ’231/’946 Accused Products, the ’005 Accused Products, the ’333 Accused Products, and the ’046 Accused Products.

16. “Downstream Product” means any product or device incorporating one or more NVIDIA Accused Products, including but not limited to smart phones, laptop or tablet computers, mobile devices, gaming devices, graphics cards, consumer electronics, data center products, supercomputers, or automotive products.

17. The terms “NVIDIA foundry” and “NVIDIA foundries” mean one or more of the foundry subcontractors that have provided or are providing fabrication, manufacturing, and/or testing services with regard to any NVIDIA Accused Product or any wafer, chip or die for any NVIDIA Accused Product, including but not limited to (a) Taiwan Semiconductor Manufacturing Company and its predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, and any other person that is acting or has acted on its behalf; and (b) any other person that has provided or is providing any type of fabrication, manufacturing, bumping, and/or testing services to NVIDIA, directly or indirectly, with regard to any NVIDIA Accused Product.

18. The terms “NVIDIA OSAT” and “NVIDIA OSATs” mean one or more of the assembly and packaging subcontractors that have provided or are providing testing, assembly and/or packaging services with regard to any NVIDIA Accused Product, including but not

limited to (a) Advanced Semiconductor Engineering; (b) Amkor Technology, Inc.; (c) Jiangsu Changjiang Electronics Technology Co., Ltd.; (d) BYD Auto Co., Ltd.; (e) Hon Hai Precision Industry Co., Ltd.; (f) JSI Logistics Ltd; (g) King Yuan Electrics Co., Ltd.; (h) Siliconware Precision Industries Company Ltd.; (i) any predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, and any other person that is acting or has acted on behalf of the persons named in (a)–(i); and (j) any other person that has provided or is providing any type of testing, assembly, and/or packaging services to NVIDIA, directly or indirectly, with regard to any NVIDIA Accused Product.

19. The term “semiconductor device(s)” refers broadly to semiconductor devices, semiconductor device packages, electronic components, wafers, dies, chips, packages, and assemblies.

20. The term “circuit board(s)” refers broadly to a sheet of insulating material used for the mounting and interconnection of components in electronic equipment, including but not limited to any circuit board, printed circuit board (PCB), printed circuit board assembly, circuit panel, printed circuit assembly, printed circuit board assembly, circuit card assembly, or backplane assembly.

21. The term “Top 10 NVIDIA Customer(s)” means, for the time period May 2013 to the present, any entity for which the worldwide unit volume of sales by NVIDIA to that entity on an annual basis (or for the May-December time period for 2013) placed that entity as one of NVIDIA’s Top 10 customers worldwide by unit volume of sales. For avoidance of doubt, this term is to be construed on an annual basis to identify the Top 10 NVIDIA Customers by year (or partial year for 2013).

22. “Manufacture” means to make, whether experimentally or commercially.

INSTRUCTIONS

1. Each request shall be answered pursuant to Fed. R. Civ. P. 26 and 34, and supplemented as required by Fed. R. Civ. P. 26(e), these requests are deemed continuing to the fullest extent possible.

2. The document requests herein shall be deemed to include any and all relevant documents within the possession, custody, or control of you, including documents located in the personal files of any and all past and present directors, officers, agents, representatives, employees, attorneys and accountants of you. If you know of the existence, past or present, of any documents or things requested below, but are unable to produce such documents or things because they are not presently in your possession, custody, or control, you shall so state and shall identify such documents or things, and the person who has possession, custody, or control of the documents or things.

3. Produce all documents as they are maintained and organized in the normal course of business, including preserving and maintaining any file structures or groupings.

4. Please produce files as text searchable image files. When a text-searchable image file is produced, please preserve the integrity of the underlying ESI, *i.e.*, the original formatting, the metadata (as noted below) and, where applicable, the revision history. Please produce files not easily converted to image format, such as Excel and Access files, in native format.

5. In the event that any document is withheld or redacted based on a claim of attorney-client privilege, attorney work-product immunity, or any other privilege, identify: (a) the date of the document or information; (b) the source of the document or information; (c) the names and addresses of all persons to whom the document or information was disclosed; and (d) the general subject matter of the document or information.

6. If any responsive document or thing has been destroyed or lost or is otherwise missing, state: (a) the date of such destruction or loss; (b) the reason for such destruction or loss; (c) the identity of the person or persons who destroyed or lost the document or thing; and (d) the identity of the person or persons who authorized such destruction.

7. These requests seek all responsive documents in their original language, and, if such original language is not English, these requests also seek all English-language translations that may exist for any such documents.

8. Each document is to be produced along with all drafts, without abbreviation or redaction.

9. Any keys, codes, explanations, manuals, or other documents necessary for the interpretation or understanding of the documents produced in response to these Requests for Production shall be produced.

10. In the event that you object to any request on the ground that it is overbroad and/or unduly burdensome for any reason, response to that request as narrowed to the least extent necessary, in your judgment, to render it not overbroad/unduly burdensome and state specifically the extent to which you have narrowed that request for purposes of your response and the factual basis for your conclusion.

11. In the event that you object to any request on the ground that it is vague and/or ambiguous, identify the particular words, terms, or phrases that are asserted to make such request vague and/or ambiguous and specify the meaning actually attributed to you by such words for purposes of your response thereto.

DOCUMENTS TO BE PRODUCED

REQUEST FOR PRODUCTION NO. 1

Documents sufficient to identify each NVIDIA Accused Product, and, separately for each product, the product name, the product number, any product family, series or group to which the product belongs, the type of product, any internal names, code names, or project names for the product, and any other designations used by you or any of the NVIDIA foundries or NVIDIA OSATs to refer to the NVIDIA Accused Products.

REQUEST FOR PRODUCTION NO. 2

For each NVIDIA Accused Product, documents sufficient to show and explain the meaning of all product numbers, product names, internal names, code names, project names, and any other designations used by you or any of the NVIDIA foundries or NVIDIA OSATs to refer to the NVIDIA Accused Products, including but not limited to any decoder or product numbering guidelines that explain how NVIDIA assigns alphanumeric characters for both short and long product numbers for the NVIDIA Accused Products.

REQUEST FOR PRODUCTION NO. 3

Separately for each NVIDIA Accused Product, documents sufficient to identify: (a) the NVIDIA foundries that fabricated, manufactured and/or tested the wafers, chips and/or dies used in the product and the location where that activity occurred; and (b) the NVIDIA OSATs that tested, packaged and/or assembled the NVIDIA Accused Products and the location where that activity occurred.

REQUEST FOR PRODUCTION NO. 4

Five physical samples of each NVIDIA Accused Product or, in the alternative, five physical samples of representative NVIDIA Accused Products along with documents sufficient

REQUEST FOR PRODUCTION NO. 41

Separately for each NVIDIA Accused Product, documents sufficient to show the number of units sold and the sales price for those units on a monthly basis from May 8, 2013, to the present; (b) total revenue that you derived from such sales; (c) total costs of such sales, including incremental costs; (d) name and address of the person to whom those products were sold based on how the sale was booked by NVIDIA; (e) name and address of the person that paid for those products based on NVIDIA's receipt of that payment; (f) name and address of the person to whom those products were delivered; and (g) projected number of units to be sold and the projected sales price for those units on a monthly or quarterly basis.

REQUEST FOR PRODUCTION NO. 42

Separately for each NVIDIA Accused Product, documents relating to each importation into the United States, including the date of importation, the quantity imported, the declared value in U.S. dollars, the importer(s), the port of entry, the person and location to which the shipment was delivered.

REQUEST FOR PRODUCTION NO. 43

Copies of your annual reports (including any Form 10Ks) for the annual or fiscal years 2013 through present, and any other investment documents (including any prospectus) prepared since May 8, 2013.

REQUEST FOR PRODUCTION NO. 44

All documents related to market or industry reports or studies related to any NVIDIA Accused Product, and dated during the period of May 8, 2013 through the present.

REQUEST FOR PRODUCTION NO. 45

All business and product development plans relating to any NVIDIA Accused Product.

REQUEST FOR PRODUCTION NO. 46

Documents sufficient to identify each distributor and each customer of each NVIDIA Accused Product that is made, used, sold, or offered for sale, in the United States, or imported into the United States.

REQUEST FOR PRODUCTION NO. 47

Separately for each NVIDIA Accused Product, documents sufficient to identify: (a) the dates of first manufacture, sale, and offer for sale in the United States; (b) the dates of first importation into the United States; (c) the unit volume and dollar value of sales made in the United States; (d) the unit volume and dollar value of sales made abroad for importation into the United States; and (e) the unit volume of importations into the United States.

REQUEST FOR PRODUCTION NO. 48

Separately for each NVIDIA Accused Product, all documents that disclose the supply chain for each product, starting with the manufacture of each product (e.g., geographic location of manufacture) and ending with the sale of the product (whether made to a distributor, a wholesaler, a retailers, or directly to a customer), including documents that identify any third party involved in any part of the supply chain, that party's role, and the dates of that party's involvement.

REQUEST FOR PRODUCTION NO. 49

Documents relating to NVIDIA's knowledge of the Asserted Patents and/or alleged infringement of one or more of the Asserted Patents, including but not limited to documents: (a) sufficient to identify the date on which NVIDIA first became aware of the Asserted Patents; (b) sufficient to identify when NVIDIA first became aware of its alleged infringement of any Asserted Patent; (c) explaining the circumstances surrounding that awareness; (d) documents

Dated: July 30, 2019

Respectfully submitted,

FARNAN LLP

/s/ Brian E. Farnan

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Attorneys for Plaintiffs

CERTIFICATE OF SERVICE

I, Brian E. Farnan, hereby certify that on July 30, 2019, a copy of Plaintiffs' First Set of Requests for Production of Documents and Things to NVIDIA Corporation (Nos. 1–114) was served on the following as indicated:

Via Hand Delivery and E-Mail

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Via E-Mail

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/s/ Brian E. Farnan

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Exhibit 4

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

INVENSAS CORPORATION and TESSERA)	
ADVANCED TECHNOLOGIES, INC.,)	
)	
Plaintiffs,	)	Case No. 19-cv-861-RGA
)	
v.)	
	)	JURY TRIAL DEMANDED
NVIDIA CORPORATION,)	
)	
Defendant.)	

PLAINTIFFS’ FIRST SET OF INTERROGATORIES TO NVIDIA CORPORATION
(Nos. 1–14)

Pursuant to Rules 26 and 33 of the Federal Rules of Civil Procedure, Invensas Corporation and Tessera Advanced Technologies, Inc. (collectively, “Plaintiffs”) request that Defendant NVIDIA Corporation answer the following interrogatories in writing within 30 days of service.

DEFINITIONS

1. The terms “NVIDIA,” “you,” “your,” and “Defendant” mean NVIDIA Corporation and all predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, or other persons that are acting or have acted on behalf of NVIDIA.
2. The term “‘231 Patent” means U.S. Patent No. 6,232,231.
3. The term “‘946 Patent” means U.S. Patent No. 6,849,946.
4. The term “‘005 Patent” means U.S. Patent No. 7,064,005.
5. The term “‘333 Patent” means U.S. Patent No. 6,317,333.

6. The term “’046 Patent” means U.S. Patent No. 5,666,046.

7. The term “Asserted Patents” means the ’231 Patent, the ’946 Patent, the ’005 Patent, the ’333 Patent, and the ’046 Patent.

8. The term “Asserted Claim” means any and all claims of the Asserted Patents that have been or are asserted against NVIDIA in this action, including without limitation any claim identified in the complaint in this action or any disclosure of asserted claims and infringement contentions.

9. The term “prior art,” for purposes of these interrogatories, means all things, patents, publications, disclosures, sales, or other acts or occurrences included within the broadest meaning of 35 U.S.C. § 102 (or any subpart thereof) and 35 U.S.C. § 103, and all things, patents, publications, disclosures, sales, or other acts or occurrences that any person or entity has identified as “prior art” or relevant to the invalidity of the patent(s) identified in the relevant interrogatory.

10. The terms “’231/’946 Accused Product” and “’231/’946 Accused Products” refer to any product comprising an NVIDIA graphics processing unit (“GPU”) or system-on-chip (“SoC”) that was fabricated for NVIDIA using TSMC’s 40nm, 28nm, 20nm, or 16nm technology node and that was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and August 31, 2018, whether or not incorporated into a Downstream Product. The terms “’231/’946 Accused Product” and “’231/’946 Accused Products” encompass, without limitation, (1) NVIDIA GPUs with the part name or number GF100, GF104, GF106, GF108, GF110, GF114, GF116, GF117, GF118, GF119 (the “40nm Fermi GPUs”); (2) NVIDIA GPUs with the part name or number GK104, GK106, GK107, GK110, GK208 (the “28nm Kepler GPUs”); (3) NVIDIA GPUs with

the part name or number GM107, GM108, GM200, GM204, GM206 (the “28nm Maxwell GPUs”); (4) NVIDIA GPUs with the part name or number GP100, GP102, GP104, GP 106 (the “16nm Pascal GPUs”); (5) NVIDIA SoCs with the part name or number T124 and T132 (the “28nm Tegra K1 SoCs”); (6) NVIDIA SoCs with the part name or number T210 and NX (the “20nm Tegra X1 SoCs”); and (7) the following NVIDIA Downstream Products:

C2070 GPU Computing Module	GeForce GT 620	GeForce GTX 560
C2075 GPU Computing Module	GeForce GT 620M	GeForce GTX 560 SE
GeForce 410M	GeForce GT 625	GeForce GTX 560 Ti
GeForce 510	GeForce GT 625M	GeForce GTX 560M
GeForce 605	GeForce GT 630	GeForce GTX 570
GeForce 610M	GeForce GT 630M	GeForce GTX 570M
GeForce 710M	GeForce GT 635	GeForce GTX 580
GeForce 720M	GeForce GT 635M	GeForce GTX 580M
GeForce 810M	GeForce GT 640	GeForce GTX 590
GeForce 820M	GeForce GT 640M	GeForce GTX 645
GeForce 825M	GeForce GT 640M LE	GeForce GTX 650
GeForce 840M	GeForce GT 645	GeForce GTX 650 Ti
GeForce 845M	GeForce GT 645M	GeForce GTX 650 Ti Boost
GeForce 920M	GeForce GT 650M	GeForce GTX 660
GeForce 930M	GeForce GT 660M	GeForce GTX 660 Ti
GeForce 940M	GeForce GT 705	GeForce GTX 670
GeForce GT 415M	GeForce GT 710	GeForce GTX 670M
GeForce GT 420	GeForce GT 720	GeForce GTX 675M
GeForce GT 420M	GeForce GT 720M	GeForce GTX 680
GeForce GT 425M	GeForce GT 730	GeForce GTX 690
GeForce GT 430	GeForce GT 730M	GeForce GTX 745
GeForce GT 435M	GeForce GT 735M	GeForce GTX 750
GeForce GT 440	GeForce GT 740	GeForce GTX 750 Ti
GeForce GT 445M	GeForce GT 740M	GeForce GTX 760
GeForce GT 520	GeForce GT 745M	GeForce GTX 760 Ti
GeForce GT 520M	GeForce GT 750M	GeForce GTX 760M
GeForce GT 520MX	GeForce GT 755M	GeForce GTX 765M
GeForce GT 525M	GeForce GT 945A	GeForce GTX 770
GeForce GT 530	GeForce GTS 450	GeForce GTX 770M
GeForce GT 540M	GeForce GTX 460	GeForce GTX 780
GeForce GT 545	GeForce GTX 460 SE	GeForce GTX 780 Ti
GeForce GT 550M	GeForce GTX 460M	GeForce GTX 780M
GeForce GT 555M	GeForce GTX 470M	GeForce GTX 850M
GeForce GT 610	GeForce GTX 485M	GeForce GTX 860M
	GeForce GTX 550 Ti	GeForce GTX 870M
	GeForce GTX 555	

GeForce GTX 880M	K20X GPU Accelerator	Quadro K4000
GeForce GTX 950	K40 GPU Accelerator	Quadro K4000M
GeForce GTX 950M	M10 GPU Accelerator	Quadro K4100M
GeForce GTX 960	M2050 GPU Module	Quadro K420
GeForce GTX 960M	M2070 GPU Computing	Quadro K4200
GeForce GTX 965M	Module	Quadro K5000
GeForce GTX 970	M2090 GPU Computing	Quadro K5000M
GeForce GTX 970M	Module	Quadro K500M
GeForce GTX 980	M4 GPU Accelerator	Quadro K5100M
GeForce GTX 980 Ti	M40 GPU Accelerator	Quadro K510M
GeForce GTX 980	Quadro 1000M	Quadro K5200
GeForce GTX 980M	Quadro 2000	Quadro K600
GeForce GTX TITAN	Quadro 3000M	Quadro K6000
GeForce GTX TITAN	Quadro 4000	Quadro K610M
Black	Quadro 4000M	Quadro K620
GeForce GTX TITAN X	Quadro 410	Quadro M1000M
GeForce GTX TITAN Z	Quadro 5000	Quadro M1200
GeForce GTX 670MX	Quadro 5000M	Quadro M2000
GeForce GTX 675MX	Quadro 500M	Quadro M2000M
GeForce GTX 680M	Quadro 5010M	Quadro M2200
GeForce GTX 680MX	Quadro 600	Quadro M500M
GeForce GTX465	Quadro 6000	Quadro M520
GeForce GTX470	Quadro 7000	Quadro M6000
GeForce GTX480	Quadro K1000M	Quadro M600M
GeForce GTX480M	Quadro K1100M	Quadro M620
GeForce MX110	Quadro K1200	Quadro NVS 315
GeForce MX130	Quadro K2000	Quadro NVS 510
GRID K1	Quadro K2000D	Quadro NVS 810
GRID K2	Quadro K2000M	Quadro Plex 7000
GRID K340	Quadro K2100M	S2050 GPU Computing
GRID K520	Quadro K2200	Server
Jetson Nano	Quadro K2200M	S2070 GPU Computing
K10 GPU Accelerator	Quadro K3000M	Server
K20 GPU Accelerator	Quadro K3100M	

11. The terms “‘005 Accused Product” and “‘005 Accused Products” refer to any NVIDIA product that is or was manufactured using TSMC’s Chip-on-Wafer-on-Substrate (“CoWoS”) technology, or any substantially similar manufacturing process wherein multiple die (e.g., processor and memory) are delivered in a single package, and that is or was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and the date of trial in this action, whether or not incorporated

into a Downstream Product. The terms “’005 Accused Product” and “’005 Accused Products” encompass, without limitation, the Tesla P100, Tesla V100, any other NVIDIA product built using NVIDIA’s Pascal or Volta architectures, and any Downstream Product that contains one or more of the preceding, including those identified at: <https://www.nvidia.com/en-us/data-center/where-to-buy-tesla/>.

12. The terms “’333 Accused Product” and “’333 Accused Products” refer to any product comprising an NVIDIA semiconductor device in a ball grid array (BGA) substrate package mounted to a circuit board, and where the product was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and April 16, 2018, whether or not incorporated into a Downstream Product. The terms “’333 Accused Product” and “’333 Accused Products” encompass, without limitation, the Tesla K10 Server Accelerator Card, the Grid K2 Graphics Card, and MSI’s GeForce GTX 750 Ti.

13. The terms “’046 Accused Product” and “’046 Accused Products” refer to any NVIDIA product comprising a semiconductor device that includes a reference voltage circuit and was fabricated for NVIDIA using TSMC’s 40nm, 28nm, 20nm, or 16nm technology node, where the product was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and August 24, 2015, whether or not incorporated into a Downstream Product. The terms “’046 Accused Product” and “’046 Accused Products” encompass, without limitation, the Kepler GK107 GPU and Tegra 3 SoC.

14. The terms “NVIDIA Accused Product” and “NVIDIA Accused Products” mean, collectively, the ’231/’946 Accused Products, the ’005 Accused Products, the ’333 Accused Products, and the ’046 Accused Products.

15. “Downstream Product” means any product or device incorporating one or more NVIDIA Accused Products, including but not limited to smart phones, laptop or tablet computers, mobile devices, gaming devices, graphics cards, consumer electronics, data center products, supercomputers, or automotive products.

16. The terms “NVIDIA foundry” and “NVIDIA foundries” mean one or more of the foundry subcontractors that have provided or are providing fabrication, manufacturing, and/or testing services with regard to any NVIDIA Accused Product or any wafer, chip or die for any NVIDIA Accused Product, including but not limited to (a) Taiwan Semiconductor Manufacturing Company and its predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, and any other person that is acting or has acted on its behalf; and (b) any other person that has provided or is providing any type of fabrication, manufacturing, bumping, and/or testing services to NVIDIA, directly or indirectly, with regard to any NVIDIA Accused Product.

17. The terms “NVIDIA OSAT” and “NVIDIA OSATs” mean one or more of the assembly and packaging subcontractors that have provided or are providing testing, assembly, and/or packaging services with regard to any NVIDIA Accused Product, including but not limited to (a) Advanced Semiconductor Engineering; (b) Amkor Technology, Inc.; (c) Jiangsu Changjiang Electronics Technology Co., Ltd.; (d) BYD Auto Co., Ltd.; (e) Hon Hai Precision Industry Co., Ltd.; (f) JSI Logistics Ltd; (g) King Yuan Electrics Co., Ltd.; (h) Siliconware Precision Industries Company Ltd.; (i) any predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, and any other person that is acting or has acted on behalf of the persons named in (a)–(i); and (j) any other person that

has provided or is providing any type of testing, assembly, and/or packaging services to NVIDIA, directly or indirectly, with regard to any NVIDIA Accused Product.

18. The term “semiconductor device(s)” refers broadly to semiconductor devices, semiconductor device packages, electronic components, wafers, dies, chips, packages, and assemblies.

19. The term “circuit board(s)” refers broadly to a sheet of insulating material used for the mounting and interconnection of components in electronic equipment, including but not limited to any circuit board, printed circuit board (PCB), printed circuit board assembly, circuit panel, printed circuit assembly, printed circuit board assembly, circuit card assembly, or backplane assembly.

20. The term “Top 10 NVIDIA Customer(s)” means, for the time period May 2013 to the present, any entity for which the worldwide unit volume of sales by NVIDIA to that entity on an annual basis (or for the May-December time period for 2013) placed that entity as one of NVIDIA’s Top 10 customers worldwide by unit volume of sales. For avoidance of doubt, this term is to be construed on an annual basis to identify the Top 10 NVIDIA Customers by year (or partial year for 2013).

21. “Manufacture” means to make, whether experimentally or commercially.

INSTRUCTIONS

1. These interrogatories are continuing in nature, and shall be supplemented or modified as required by Fed. R. Civ. P. 26(e) to the fullest extent possible.

2. If NVIDIA answers any interrogatory, in whole or in part, by producing documents in accordance with Fed. R. Civ. P. 33(d), specify by production number the specific document or group of documents responsive to the interrogatory.

3. Unless otherwise specified, the relevant time period for these interrogatories is May 8, 2013 through the trial date set in this case.

4. If in responding to any interrogatory, you object to any interrogatory or any portion thereof, you should identify the portion to which you object, explain the basis of the objection, and respond to the portion of the interrogatory to which you do not object.

5. If you object to any interrogatory on the ground that it is overbroad and/or unduly burdensome for any reason, answer the interrogatory as narrowed to the least extent necessary, in your judgment, to render it not overbroad/unduly burdensome, and state specifically the extent to which you have narrowed the interrogatory for purposes of your response.

6. If in responding to any interrogatory, you claim ambiguity in either the interrogatory or a definition or an instruction applicable thereto, identify in your response the language you consider ambiguous and state the interpretation you used to respond to the interrogatory.

7. If in responding to any interrogatory, you withhold the answer to all or part of the interrogatory on the claim of privilege, work product, or other privilege or immunity, you shall state the specific factual and legal basis for doing so and answer any part of the interrogatory which is not alleged to be privileged. The information regarding the factual and legal basis for the assertion of privilege should be supplied in sufficient detail to permit Plaintiffs to assess the applicability of the privilege claimed.

INTERROGATORIES

INTERROGATORY NO. 1

Separately identify each '231/'946 Accused Product. Your identification should include: (a) the semiconductor device short product number (e.g., GM206); (b) the semiconductor device extended product number (e.g., GM206-300-A1); (c) the NVIDIA microarchitecture name (e.g.,

Downstream Product and an identification of each and every document that reflects such information.

INTERROGATORY NO. 6

Separately for each NVIDIA Accused Product from May 8, 2013 to the present, identify the (a) number of units sold and the sales price for those units on a monthly basis; (b) total revenue that you derived from such sales; (c) total costs of such sales, including incremental costs; (d) name and address of the person to whom those products were sold based on how the sale was booked by NVIDIA; (e) name and address of the person that paid for those products based on NVIDIA's receipt of payment; (f) name and address of the person to whom those products were delivered; (g) name and address of the end customer; and (h) projected number of units to be sold and the projected sales price for those units on a monthly or quarterly basis.

INTERROGATORY NO. 7

Separately for each of the Asserted Patents, describe in detail when you first became aware of such Asserted Patent, including the date, the circumstances, and who was involved or has knowledge thereof. Include in your response the identity of each document that supports your answer or to which you referred in preparing your answer.

Dated: July 30, 2019

Respectfully submitted,

FARNAN LLP

/s/ Brian E. Farnan

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CERTIFICATE OF SERVICE

I, Brian E. Farnan, hereby certify that on July 30, 2019, a copy of Plaintiffs' First Set of Interrogatories to NVIDIA Corporation (Nos. 1–14) was served on the following as indicated:

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/s/ Brian E. Farnan

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Exhibit 5

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

INVENSAS CORPORATION and TESSERA
ADVANCED TECHNOLOGIES, INC.,

Plaintiffs,

v.

NVIDIA CORPORATION,

Defendant.

C.A. NO. 19-00861-RGA

JURY TRIAL DEMANDED

**DEFENDANT NVIDIA CORPORATION’S RESPONSES AND OBJECTIONS TO
PLAINTIFFS’ FIRST SET OF REQUESTS FOR PRODUCTION (Nos. 1–114)**

Pursuant to Rule 34 of the Federal Rules of Civil Procedure, Defendant NVIDIA Corporation (“NVIDIA” or “Defendant”) hereby responds to Plaintiffs Invensas Corporation and Tessera Advanced Technologies, Inc.’s (collectively, “Plaintiffs”) First Set of Requests for Production as follows:

GENERAL STATEMENT AND OBJECTIONS

1. NVIDIA is committed to a reasonable, proportionate, and sensible discovery process, consistent with the Court’s Scheduling Order, the Federal Rules of Civil Procedure, and the Delaware Local Rules. NVIDIA seeks to work cooperatively with Plaintiffs on the appropriate scope and timing of productions to ensure that the requested discovery is proportional to the needs of the case and to provide each side an opportunity to develop the facts necessary to address their claims and defenses. On their face, Plaintiffs’ requests for production take a dramatically different approach, improperly pursuing scorched-earth discovery through requests seeking massive productions of “all” documents on wide-ranging topics, regardless of relevance or burden. Plaintiffs’ requests are exactly the type of abusive discovery practices the

Federal and Local Rules are designed to prevent. As a result of Plaintiffs' improper requests, NVIDIA provides the following objections and responses.

2. NVIDIA objects to each request, definition and instruction to the extent that it seeks to impose duties or obligations on NVIDIA contrary to those set forth in the Federal Rules of Evidence, the Federal Rules of Civil Procedure, the Delaware Local Rules, the Court's orders or any agreement reached between the parties including, but not limited to, any orders or agreements governing the discovery of Electrically Stored Information ("ESI"). To the extent that a request requires, explicitly or implicitly, documents related to the construction of one or more patent claim terms or NVIDIA's positions regarding non-infringement or invalidity, core technical documents or emails, such a request is premature in light of the Court's Scheduling Order and the forthcoming ESI Order. *See* D.I. 25.

3. The following responses are based on information available as of the date of these responses. Discovery is just beginning, and these responses are therefore subject to revision. It is anticipated that further discovery, investigation, and analysis may supply additional facts and add meaning to known facts, as well as establish entirely new factual conclusions and legal contentions, all of which may lead to substantial changes, additions, or variations to the responses set forth herein.

4. The following responses are given without prejudice to NVIDIA's right to produce evidence of any subsequently discovered document or documents that NVIDIA may later recall or produce. NVIDIA accordingly reserves the right to change the responses herein as additional facts are ascertained, analysis is made, legal research is completed, and contentions are made. The responses contained herein are made in a good faith effort to comply with the provisions of F.R.C.P. 34, and to supply as much factual information as is presently known, but

nothing in these responses shall limit NVIDIA's ability to conduct further investigation, research, or analysis, or to amend the responses as necessary at or before trial.

5. In addition to any specific objections that may be made on an individual basis in the separate responses set forth below, NVIDIA objects generally to each request to the extent that it seeks disclosure of information that is protected by the attorney-client privilege, the attorney work product doctrine, joint defense, common interest and/or any other applicable privilege, protection or doctrine. Nothing contained herein is intended to be or should be construed as a waiver of the attorney-client privilege, the attorney work-product doctrine, joint defense and/or common interest privilege or other applicable privileges or doctrines.

6. NVIDIA further objects to each request to the extent that it seeks it seeks confidential or proprietary information pertaining to NVIDIA's business, trade secrets and/or economic relationships, or to the extent that it seeks confidential information which would impugn upon any protected right to privacy. NVIDIA will provide such information subject to a Protective Order to be entered into by the Court.

7. NVIDIA further objects to each request to the extent that it seeks information that contains confidential, proprietary or trade secret information of third parties. NVIDIA will provide such information in response to such requests subject to the Protective Order to be entered into by the Court, and any provision of any such information will be subject to any consent required by third parties.

8. These responses are made solely for the purpose of discovery in this action. Nothing herein is intended to waive the following objections, which are expressly reserved: all objections as to competency, relevancy, authenticity, propriety, materiality and admissibility of the subject matter of the requests; all objections as to vagueness, ambiguity, or undue burden; all

objections on any ground as to the use of any information provided in response to these requests; all objections on any ground to any request for further responses to these or other requests; and any and all other objections and grounds that would or could require or permit the exclusion of any document or statement therein from evidence, all of which objections and grounds are reserved and may be interposed at the time of trial.

9. NVIDIA objects to each request, definition and instruction to the extent that it seeks information that is neither relevant to the subject matter of this action nor proportional to the needs of the case.

10. NVIDIA objects to each request to the extent that it requires NVIDIA to search for and reveal privileged information or communications from its or its attorneys' litigation files pertaining to the case.

11. NVIDIA objects to each request to the extent that it seeks to impose an obligation to identify or search for documents or information at any location other than that at which they would be stored in the ordinary course of business.

12. NVIDIA objects to each request to the extent that it is cumulative and duplicative of other forms of discovery that are more convenient and less burdensome. NVIDIA further objects to each request to the extent that it seeks to require NVIDIA to do more than conduct an examination of those files or sources that reasonably may be expected to yield responsive information or an inquiry of those persons who reasonably may be expected to possess responsive information.

13. NVIDIA objects generally to the temporal scope of the requests as overly broad, unduly burdensome, and neither relevant nor reasonably calculated to lead to the discovery of

admissible evidence to the extent that it does not contain any reasonable or appropriate temporal limitation.

14. NVIDIA objects generally to these requests to the extent that they seek a legal conclusion or expert opinion.

15. NVIDIA objects to each request to the extent it calls for information not within the possession, custody or control of NVIDIA. The responses given herein are based upon information reasonably available to NVIDIA.

16. No incidental or implied admissions are intended by the responses herein. The fact that NVIDIA has answered or objected to any request should not be taken as an admission that NVIDIA accepts or admits the existence of any “facts” set forth or assumed by such request. The fact that NVIDIA has answered part or all of a request is not intended to be, and shall not be construed to be, a waiver by NVIDIA of any part or any objection to any request.

17. NVIDIA objects generally to these requests to the extent that they seek information already in Plaintiff’s possession or that is equally available to Plaintiff from public sources.

18. NVIDIA objects generally to the requests and to the definitions of the terms “‘231/’946 Accused Product(s),” “‘005 Accused Product(s),” “‘333 Accused Product(s),” “‘046 Accused Product(s),” and “NVIDIA Accused Product(s)” as overly broad, unduly burdensome and not reasonably calculated to lead to the discovery of admissible evidence. NVIDIA further objects to the definitions of these terms to the extent that they purport to cover products that are outside the scope of this action or products that were sold, shipped, and delivered outside the United States. NVIDIA further objects to the definitions of these terms on the ground that they are vague and ambiguous. NVIDIA objects to the definitions of these terms to the extent that

they seek information concerning products that are not imported into or made, used, offered for sale or sold in the United States or products that are imported into or made, used, offered for sale or sold in the United States by an entity other than NVIDIA. NVIDIA further objects to the definitions of these terms on the ground that they are overly broad as to time.

19. NVIDIA objects to the definition of the term “Downstream Product” as overly broad, unduly burdensome, and not reasonably calculated to lead to the discovery of admissible evidence. NVIDIA further objects to the definition of “Downstream Product” to the extent that it purports to cover products that are outside the scope of this action or products that were sold, shipped, and delivered outside the United States. NVIDIA further objects to the definition of “Downstream Product” on the ground that it is vague and ambiguous. NVIDIA further objects to the definition of “Downstream Product” to the extent that it seeks information concerning products that are not imported into or made, used, offered for sale or sold in the United States or products that are imported into or made, used, offered for sale or sold in the United States by an entity other than NVIDIA. NVIDIA further objects to the definition of “Downstream Product” on the ground that it is overly broad as to time. NVIDIA further objects to the definition of “Downstream Product” on the ground that it calls for information outside NVIDIA’s possession, custody or control or information not kept in the ordinary course of business.

20. NVIDIA objects to the definition of the term “Top 10 NVIDIA Customer” as vague, overly broad and not reasonably calculated to lead to the discovery of admissible evidence to the extent that it purports to cover products that are outside the scope of this action or products that were sold, shipped, and delivered outside the United States. NVIDIA further objects to the definition to the extent that it seeks information concerning products that are not imported into or made, used, offered for sale or sold in the United States or products that are

imported into or made, used, offered for sale or sold in the United States by an entity other than NVIDIA.

21. NVIDIA objects to the definition of the terms “NVIDIA foundry” and “NVIDIA foundries,” “semiconductor device,” “circuit board” and “NVIDIA OSAT” and “NVIDIA OSATs” as vague, overly broad and not reasonably calculated to lead to the discovery of admissible evidence.

22. NVIDIA objects to the definition of the terms “NVIDIA,” “Defendant,” “you” and “your” as overly broad and unduly burdensome to the extent that it includes NVIDIA’s “predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, or other persons that are acting or have acted on behalf of NVIDIA.” NVIDIA further objects to the definition of the terms “NVIDIA,” “Defendant,” “you” and “your” on the ground that it calls for the production of information protected from disclosure by the attorney-client privilege and/or attorney-work product doctrine in so far as the definition purports to include attorneys. NVIDIA expressly disclaims any undertaking or obligation to provide information for or on behalf of any other person or entity. NVIDIA will construe these terms to mean Defendant NVIDIA Corporation.

23. NVIDIA objects to the definition of the term “Document” to the extent that it purports to impose burdens on NVIDIA greater than, inconsistent with, or not authorized by, the F.R.C.P., the Delaware Local Rules, the Court’s orders, or any agreement regarding ESI reached between the parties and/or endorsed by the Court.

24. NVIDIA objects generally to these requests to the extent that they request production of “any” or “all” documents or agreements relating to a particular subject matter on the grounds that such a request is overly broad and unduly burdensome, and neither relevant nor

proportional to the needs of the case. Unless otherwise indicated NVIDIA will produce documents sufficient to show or disclose the requested information.

25. NVIDIA objects to all instructions, including, but not limited to, the instructions to produce “all drafts, without abbreviation or redaction,” “preserv[e] and maintain any file structures or groupings,” “produce files as text searchable image files” and, with respect to “any documents destroyed or lost or is otherwise missing state: (a) the date of such destruction or loss; (b) the reason for such destruction or loss; (c) the identity of the person or persons who destroyed or lost the document or thing; and (d) the identity of the person or persons who authorized such destruction” to the extent they seek to impose obligations on NVIDIA beyond those set forth in the Federal Rules of Evidence, F.R.C.P., the Local Rules of Civil Practice and Procedure of the United States District Court for the District of Delaware (“Delaware Local Rules”), the Court’s orders or any agreement reached between the parties including, but not limited to, any orders or agreements governing the discovery of Electrically Stored Information (“ESI”). NVIDIA objects to these instructions as overly broad and unduly burdensome. NVIDIA objects to these instructions to the extent they seek the production of documents in a format other than how they are kept in the ordinary course of business. Unless otherwise indicated, NVIDIA will produce final versions of relevant documents sufficient to show or disclose the requested information.

26. The failure to include a general objection in any specific objection does not waive any general objection to that request. Moreover, any statement of intent to provide information responsive to a particular request is not, and shall not be deemed, a representation that any such information exists or is in the possession, custody or control of NVIDIA.

27. The General Statement and Objections shall be deemed to be incorporated in full to each response set forth below, and any statement of intent to produce information contained in any such response is subject to the limitations, objections and exceptions set forth herein.

Subject to the foregoing General Statement and Objections, NVIDIA responds as follows:

REQUESTS FOR PRODUCTION

REQUEST FOR PRODUCTION 1:

Documents sufficient to identify each NVIDIA Accused Product, and separately for each product, the product name, the product number, any product family, series or group to which the product belongs, the type of product, any internal names, code names, or project names for the product, and any other designations used by you or any of the NVIDIA foundries or NVIDIA OSATs to refer to the NVIDIA Accused Products.

RESPONSE TO REQUEST FOR PRODUCTION 1:

NVIDIA objects to this request on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to the term “NVIDIA Accused Product” as overly broad as to scope and unduly burdensome and to the extent it seeks information regarding products that are outside the scope of this case. NVIDIA objects to this request as overly broad and unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to this request on the grounds that it seeks information that are outside NVIDIA’s possession, custody and control or that is not maintained in the ordinary course of business. NVIDIA objects to the temporal scope of this request as overly broad, unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to this request on the grounds that the terms or phrases “NVIDIA

and pursuant to the Protective Order to be entered in this case. NVIDIA objects to the terms and phrases “’046 Accused Product,” “shared pn junction in the design of a voltage reference circuit” and “output voltage is generated based on the sum of two currents” as vague, ambiguous, overly broad and unduly burdensome. NVIDIA objects to this request on the grounds that it is premature in view of the timetable set forth in the Scheduling Order. *See* D.I. 25.

Subject to and without waiving the foregoing General and Specific Objections, NVIDIA will produce or make available for inspection responsive, non-privileged documents, if any, sufficient to identify the persons who designed the accused feature for the products specifically accused of infringing the ’046 patent during the relevant time period in its possession, custody or control, that can be located after a reasonable search.

REQUEST FOR PRODUCTION NO. 41:

Separately for each NVIDIA Accused Product, documents sufficient to show the number of units sold and the sales price for those units on a monthly basis from May 8, 2013, to the present; (b) total revenue that you derived from such sales; (c) total costs of such sales, including incremental costs; (d) name and address of the person to whom those products were sold based on how the sale was booked by NVIDIA; (e) name and address of the person that paid for those products based on NVIDIA’s receipt of that payment; (f) name and address of the person to whom those products were delivered; and (g) projected number of units to be sold and the projected sales price for those units on a monthly or quarterly basis.

RESPONSE TO REQUEST FOR PRODUCTION NO. 41:

NVIDIA objects to this request on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to the term “NVIDIA Accused Product” as overly broad as to scope and unduly

burdensome and to the extent it seeks information regarding products that are outside the scope of this case. NVIDIA objects to this request as overly broad and unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to the temporal scope of this request as overly broad, unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to this request on the grounds that it seeks information that are outside NVIDIA's possession, custody and control or that is not maintained in the ordinary course of business. NVIDIA objects to this request to the extent that it seeks disclosure of confidential information from third parties that NVIDIA is under an obligation not to disclose. NVIDIA will disclose or produce such information subject to any required third party consent or permission and pursuant to the Protective Order to be entered in this case. NVIDIA objects to this request to the extent it requires disclosure of information regarding specific customers of any products. NVIDIA objects to the terms and phrases "projected number of units," "projected sales price," and "how the sale was booked" vague, ambiguous, overly broad and unduly burdensome. NVIDIA objects to this request on the grounds that it is premature in view of the timetable set forth in the Scheduling Order. *See* D.I. 25.

Subject to and without waiving the foregoing General and Specific Objections, NVIDIA will produce responsive, non-privileged documents, if any, sufficient to show summary of sales information as kept in the ordinary course of business for the products specifically accused of infringement that were sold for shipment into the United States during the relevant time period in its possession, custody or control, that can be located after a reasonable search.

REQUEST FOR PRODUCTION NO. 42:

Separately for each NVIDIA Accused Product, documents relating to each importation into the United States, including the date of importation, the quantity imported, the declared

value in U.S. dollars, the importer(s), the port of entry, the person and location to which the shipment was delivered.

RESPONSE TO REQUEST FOR PRODUCTION NO. 42:

NVIDIA objects to this request on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to the term “NVIDIA Accused Product” as overly broad as to scope and unduly burdensome and to the extent it seeks information regarding products that are outside the scope of this case. NVIDIA objects to this request as overly broad and unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to the temporal scope of this request as overly broad, unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to this request on the grounds that it seeks information that are outside NVIDIA’s possession, custody and control or that is not maintained in the ordinary course of business. NVIDIA objects to this request to the extent that it seeks disclosure of confidential information from third parties that NVIDIA is under an obligation not to disclose. NVIDIA will disclose or produce such information subject to any required third party consent or permission and pursuant to the Protective Order to be entered in this case. NVIDIA objects to this request to the extent it requires disclosure of information regarding specific customers of any products. NVIDIA objects to the terms and phrases “declared value” and “documents relating to importation” as vague, ambiguous, overly broad and unduly burdensome. NVIDIA objects to this request on the grounds that it is premature in view of the timetable set forth in the Scheduling Order. *See* D.I. 25.

Subject to and without waiving the foregoing General and Specific Objections, **NVIDIA will produce responsive, non-privileged documents, if any, sufficient to show summary of sales**

information as kept in the ordinary course of business for the products specifically accused of infringement that were sold for shipment into the United States during the relevant time period in its possession, custody or control, that can be located after a reasonable search.

REQUEST FOR PRODUCTION NO. 43:

Copies of your annual reports (including any Form 10Ks) for the annual or fiscal years 2013 through present, and any other investment documents (including any prospectus) prepared since May 8, 2013.

RESPONSE TO REQUEST FOR PRODUCTION NO. 43:

NVIDIA objects to this request on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to this request on the ground that the information it seeks is already in Plaintiffs' possession or is equally available to Plaintiffs from public sources. NVIDIA objects to this request as overly broad and unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to the temporal scope of this request as overly broad, unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to this requests to the extent it seeks to elicit information subject to and protected by the attorney-client privilege, the attorney work product doctrine, joint defense or common interest privilege and/or any other applicable privileges, protections, or immunities. NVIDIA objects to the terms "any other investment documents" as vague, ambiguous, overly broad and unduly burdensome.

Subject to and without waiving the foregoing General and Specific Objections, NVIDIA will produce Form 10Ks during the relevant time period in its possession, custody or control, that can be located after a reasonable search.

course of business. NVIDIA objects to this request to the extent that it seeks disclosure of confidential information from third parties that NVIDIA is under an obligation not to disclose. NVIDIA will disclose or produce such information subject to any required third party consent or permission and pursuant to the Protective Order to be entered in this case. NVIDIA objects to this request to the extent it requires disclosure of information regarding specific customers of any products. NVIDIA objects to this request on the grounds that it is premature in view of the timetable set forth in the Scheduling Order. *See* D.I. 25.

Subject to and without waiving the foregoing General and Specific Objections, NVIDIA will produce responsive, non-privileged documents, if any, sufficient to show summary of sales information as kept in the ordinary course of business for the products specifically accused of infringement that were sold for shipment into the United States during the relevant time period in its possession, custody or control, that can be located after a reasonable search.

REQUEST FOR PRODUCTION NO. 48:

Separately for each NVIDIA Accused Product, all documents that disclose the supply chain for each product, starting with the manufacture of each product (e.g., geographic location of manufacture) and ending with the sale of the product (whether made to a distributor, a wholesaler, a retailers, or directly to a customer), including documents that identify any third party involved in any part of the supply chain, that party's role, and the dates of that party's involvement.

RESPONSE TO REQUEST FOR PRODUCTION NO. 48:

NVIDIA objects to this request on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to this request on the ground that the request to produce "all" of the types of

documents that are listed renders this request overly broad, unduly burdensome and harassing. NVIDIA objects to the term “NVIDIA Accused Product” as overly broad as to scope and unduly burdensome and to the extent it seeks information regarding products that are outside the scope of this case. NVIDIA objects to this request as overly broad and unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to the temporal scope of this request as overly broad, unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to this request on the grounds that it seeks information that are outside NVIDIA’s possession, custody and control or that is not maintained in the ordinary course of business. NVIDIA objects to this request to the extent that it seeks to elicit information subject to and protected by the attorney-client privilege, the attorney work product doctrine, joint defense or common interest privilege and/or any other applicable privileges, protections, or immunities. NVIDIA objects to this request to the extent that it seeks disclosure of confidential information from third parties that NVIDIA is under an obligation not to disclose. NVIDIA will disclose or produce such information subject to any required third party consent or permission and pursuant to the Protective Order to be entered in this case. NVIDIA objects to this request to the extent it requires disclosure of information regarding specific customers of any products. NVIDIA objects to this request on the grounds that it is premature in view of the timetable set forth in the Scheduling Order. *See* D.I. 25. NVIDIA objects to the terms “supply chain,” “involved” and “involvement” as vague, ambiguous, overly broad and unduly burdensome.

Subject to and without waiving the foregoing General and Specific Objections, NVIDIA will produce responsive, non-privileged documents, if any, sufficient to show summary of sales information as kept in the ordinary course of business for the products specifically accused of

infringement that were sold for shipment into the United States during the relevant time period in its possession, custody or control, that can be located after a reasonable search.

REQUEST FOR PRODUCTION NO. 49:

Documents relating to NVIDIA's knowledge of the Asserted Patents and/or alleged infringement of one or more of the Asserted Patents, including but not limited to documents: (a) sufficient to identify the date on which NVIDIA first became aware of the Asserted Patents; (b) sufficient to identify when NVIDIA first became aware of its alleged infringement of any Asserted Patent; (c) explaining the circumstances surrounding that awareness; (d) documents relating to any investigation conducted by NVIDIA and any conclusions that it reached with regard to the Asserted Patents and the alleged infringement.

RESPONSE TO REQUEST FOR PRODUCTION NO. 49:

NVIDIA objects to this request on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to this requests to the extent it seeks to elicit information subject to and protected by the attorney-client privilege, the attorney work product doctrine, joint defense or common interest privilege and/or any other applicable privileges, protections, or immunities. NVIDIA objects to this request to the extent that it seeks a legal conclusion. NVIDIA objects to this request on the grounds that it is argumentative and assumes facts. NVIDIA objects to this request on the ground that the information it seeks is already in Plaintiffs' possession, is equally available to Plaintiffs from public sources, or is outside NVIDIA's possession, custody or control. NVIDIA objects to this request as overly broad and unduly burdensome, and neither relevant nor proportional to the needs of the case. NVIDIA objects to this request to the extent it seeks the production of emails. NVIDIA objects to this request on the ground that the phrases

proportional to the needs of the case. NVIDIA objects to this requests to the extent it seeks to elicit information subject to and protected by the attorney-client privilege, the attorney work product doctrine, joint defense or common interest privilege and/or any other applicable privileges, protections, or immunities. NVIDIA objects to the term “assertions of infringement” as vague, ambiguous, overly abroad and unduly burdensome.

Subject to and without waiving the foregoing General and Specific Objections, NVIDIA will produce responsive, non-privileged prosecution files, if any exist, relating to NVIDIA’s U.S. Patent No. 7,253,599 that are in NVIDIA’s possession, custody or control and that can be located after a reasonable search.

Dated: August 29, 2019

Of Counsel:

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*Attorneys for Defendant
 NVIDIA Corporation*

CERTIFICATE OF SERVICE

I, Brian A. Biggs, hereby certify that on this 29th day of August, 2019, I caused a true and correct copy of the foregoing **DEFENDANT NVIDIA CORPORATION'S RESPONSES AND OBJECTIONS TO PLAINTIFFS' FIRST SET OF REQUESTS FOR PRODUCTION (Nos. 1-114)** to be sent to the following counsel of record via electronic mail:

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/s/ Brian A. Biggs
Brian A. Biggs (DE Bar No. 5591)

Exhibit 6

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

INVENSAS CORPORATION and TESSERA
ADVANCED TECHNOLOGIES, INC.,

Plaintiffs,

v.

NVIDIA CORPORATION,

Defendant.

C.A. NO. 19-00861-RGA

JURY TRIAL DEMANDED

**DESIGNATED CONFIDENTIAL
PURSUANT TO DELAWARE L.R. 26.2**

**DEFENDANT NVIDIA CORPORATION'S RESPONSES AND OBJECTIONS TO
PLAINTIFFS' FIRST SET OF INTERROGATORIES (NOS. 1-14)**

Pursuant to Rules 26 and 33 of the Federal Rules of Civil Procedure ("F.R.C.P."), Defendant NVIDIA Corporation ("NVIDIA") provides these responses to the First Set of Interrogatories (Nos. 1-14) by Plaintiffs Invensas Corporation and Tessera Advanced Technologies, Inc. (collectively, "Plaintiffs") as follows:

GENERAL STATEMENT AND OBJECTIONS

1. NVIDIA objects to each interrogatory, definition and instruction to the extent that it seeks to impose duties or obligations on NVIDIA beyond those set forth in the Federal Rules of Evidence, F.R.C.P., the Local Rules of Civil Practice and Procedure of the United States District Court for the District of Delaware ("Delaware Local Rules"), the Court's orders or any agreement reached between the parties. In this regard, to the extent that an interrogatory requires, explicitly or implicitly, the construction of one or more patent claim terms, the comparison of the asserted claims and the prior art, NVIDIA's positions regarding non-infringement, information regarding core technical documents, or sales information before Plaintiffs' service of sufficient identification of accused products, such interrogatory is premature

in light of the Court's Scheduling Order. *See* D.I. 25.

2. The following responses are based on information available as of the date of these responses. Discovery is not yet complete, and these responses are therefore subject to revision. It is anticipated that further discovery, investigation, and analysis may supply additional facts and add meaning to known facts, as well as establish entirely new factual conclusions and legal contentions, all of which may lead to substantial changes, additions, or variations to the information set forth herein.

3. The following responses are given without prejudice to NVIDIA's right to produce evidence of any subsequently discovered fact or facts that NVIDIA may later recall or produce. NVIDIA accordingly reserves the right to change the responses herein as additional facts are ascertained, analysis is made, legal research is completed, and contentions are made. The responses contained herein are made in a good faith effort to comply with the provisions of F.R.C.P 26 and 33, and to supply as much factual information as is presently known, but nothing in these responses shall limit NVIDIA's ability to conduct further investigation, research, or analysis, or to amend the responses as necessary at or before trial.

4. In addition to any specific objections that may be made on an individual basis in the separate responses set forth below, NVIDIA objects generally to each interrogatory to the extent that it seeks disclosure of information that is protected by the attorney-client privilege, the attorney work product doctrine, joint defense, common interest and/or any other applicable privilege, protection or doctrine. Nothing contained herein is intended to be or should be construed as a waiver of the attorney-client privilege, the attorney work-product doctrine, joint defense and/or common interest privilege or other applicable privileges or doctrines.

5. NVIDIA objects to each interrogatory to the extent that it seeks confidential or

proprietary information pertaining to NVIDIA's business, trade secrets and/or economic relationships, or to the extent that it seeks confidential information which would impugn upon any protected right to privacy. NVIDIA will provide such information subject to a Protective Order to be entered into by the Court.

6. NVIDIA further objects to each interrogatory to the extent that it seeks information that contains confidential, proprietary or trade secret information of third parties. NVIDIA will provide such information in response to such interrogatories subject to the Protective Order to be entered into by the Court, and any provision of any such information will be subject to any consent required by third parties.

7. These responses are made solely for the purpose of discovery in this action. Nothing herein is intended to waive the following objections, which are expressly reserved: all objections as to competency, relevancy, authenticity, propriety, materiality and admissibility of the subject matter of the interrogatories; all objections as to vagueness, ambiguity, or undue burden; all objections on any ground as to the use of any information provided in response to these interrogatories; all objections on any ground to any interrogatory for further responses to these or other interrogatories; and any and all other objections and ground that would or could require or permit the exclusion of any document or statement therein from evidence, all of which objections and ground are reserved and may be interposed at the time of trial.

8. NVIDIA objects generally to the interrogatories and to the definitions of the terms "'231/'946 Accused Product(s)," "'005 Accused Product(s)," "'333 Accused Product(s)," "'046 Accused Product(s)," and "NVIDIA Accused Product(s)" as overly broad, unduly burdensome and not reasonably calculated to lead to the discovery of admissible evidence. NVIDIA further objects to the definitions of these terms to the extent that they purport to cover products that are

outside the scope of this action or products that were sold, shipped, and delivered outside the United States. NVIDIA further objects to the definitions of these terms on the ground that they are vague and ambiguous. NVIDIA objects to the definitions of these terms to the extent that they seek information concerning products that are not imported into or made, used, offered for sale or sold in the United States or products that are imported into or made, used, offered for sale or sold in the United States by an entity other than NVIDIA. NVIDIA further objects to the definitions of these terms on the ground that they are overly broad as to time.

9. NVIDIA objects to the definition of the term “Downstream Product” as overly broad, unduly burdensome, and not reasonably calculated to lead to the discovery of admissible evidence. NVIDIA further objects to the definition of “Downstream Product” to the extent that it purports to cover products that are outside the scope of this action or products that were sold, shipped, and delivered outside the United States. NVIDIA further objects to the definition of “Downstream Product” on the ground that it is vague and ambiguous. NVIDIA further objects to the definition of “Downstream Product” to the extent that it seeks information concerning products that are not imported into or made, used, offered for sale or sold in the United States or products that are imported into or made, used, offered for sale or sold in the United States by an entity other than NVIDIA. NVIDIA further objects to the definition of “Downstream Product” on the ground that it is overly broad as to time. NVIDIA further objects to the definition of “Downstream Product” on the ground that it calls for information outside NVIDIA’s possession, custody or control or information not kept in the ordinary course of business.

10. NVIDIA objects to the definition of the term “Top 10 NVIDIA Customer” as vague, overly broad and not reasonably calculated to lead to the discovery of admissible evidence to the extent that they purport to cover products that are outside the scope of this action

or products that were sold, shipped, and delivered outside the United States. NVIDIA further objects to the definition to the extent that it seeks information concerning products that are not imported into or made, used, offered for sale or sold in the United States or products that are imported into or made, used, offered for sale or sold in the United States by an entity other than NVIDIA.

11. NVIDIA objects to the definition of the terms “NVIDIA foundry” and “NVIDIA foundries,” “semiconductor device,” “circuit board” and “NVIDIA OSAT” and “NVIDIA OSATs” as vague, overly broad and not reasonably calculated to lead to the discovery of admissible evidence.

12. NVIDIA objects to each interrogatory, definition and instruction to the extent that it seeks information that is neither relevant to the subject matter of this action nor reasonably calculated to lead to the discovery of admissible evidence.

13. NVIDIA objects to each interrogatory to the extent that it requires NVIDIA to search for and reveal privileged information or communications from its or its attorneys’ litigation files pertaining to the case.

14. NVIDIA objects to each interrogatory to the extent that it seeks to impose an obligation to identify or search for documents or information at any location other than that at which they would be stored in the ordinary course of business.

15. NVIDIA objects to each interrogatory to the extent that it is cumulative and duplicative of other forms of discovery that are more convenient and less burdensome. NVIDIA further objects to each interrogatory to the extent that it seeks to require NVIDIA to do more than conduct an examination of those files or sources that reasonably may be expected to yield responsive information or an inquiry of those persons who reasonably may be expected to

possess responsive information.

16. NVIDIA objects to each interrogatory to the extent that it includes multiple subparts that should be propounded, numbered, or counted as separate interrogatories in accordance with F.R.C.P. 33.

17. NVIDIA objects to the definition of the terms “NVIDIA,” “Defendant,” “you” and “your” as overly broad and unduly burdensome to the extent that it includes NVIDIA’s “predecessors, successors, parents, subsidiaries, affiliates, directors, officers, agents, representatives, consultants, attorneys, or other persons that are acting or have acted on behalf of NVIDIA.” NVIDIA further objects to the definition of the terms “NVIDIA,” “Defendant,” “you” and “your” on the ground that it calls for the production of information protected from disclosure by the attorney-client privilege and/or attorney-work product doctrine in so far as the definition purports to include attorneys. NVIDIA expressly disclaims any undertaking or obligation to provide information for or on behalf of any other person or entity. NVIDIA will construe these terms to mean Defendant NVIDIA Corporation.

18. NVIDIA objects to the definition of the term “Document” to the extent that it purports to impose burdens on NVIDIA greater than, inconsistent with, or not authorized by, the F.R.C.P., the Delaware Local Rules, the Court’s orders, or any agreement regarding electronically stored information (“ESI”) reached between the parties and/or endorsed by the Court.

19. NVIDIA objects generally to the temporal scope of the interrogatories as overly broad, unduly burdensome, and neither relevant nor reasonably calculated to lead to the discovery of admissible evidence to the extent that it does not contain any reasonable or appropriate temporal limitation.

20. NVIDIA objects generally to these interrogatories to the extent they seek a legal conclusion or expert opinion.

21. NVIDIA objects to the extent that each interrogatory calls for information not within the possession, custody or control of NVIDIA. The responses given herein are based upon information reasonably available to NVIDIA.

22. No incidental or implied admissions are intended by the responses herein. The fact that NVIDIA has answered or objected to any interrogatory should not be taken as an admission that NVIDIA accepts or admits the existence of any “facts” set forth or assumed by such interrogatory. The fact that NVIDIA has answered part or all of any interrogatory is not intended to be, and shall not be construed to be, a waiver by NVIDIA of any part or any objection to any interrogatory.

23. NVIDIA objects generally to these interrogatories to the extent they seek information already in Plaintiffs’ possession or that is equally available to Plaintiffs from public sources.

24. The General Statement and Objections shall be deemed to be incorporated in full into each response set forth below, and any statement of intent to produce information contained in any such response is subject to the limitations, objections and exceptions set forth herein.

Subject to the foregoing General Statement and Objections, NVIDIA responds as follows

ANSWERS TO THE FIRST SET OF INTERROGATORIES

INTERROGATORY NO. 1

Separately identify each ’231/’946 Accused Product. Your identification should include: (a) the semiconductor device short product number (e.g., GM206); (b) the semiconductor device extended product number (e.g., GM206-300-A1); (c) the NVIDIA microarchitecture name (e.g.,

Discovery is just beginning and NVIDIA reserves the right to supplement or amend this interrogatory as additional information is known.

INTERROGATORY NO. 6

Separately for each NVIDIA Accused Product from May 8, 2013 to the present, identify the (a) number of units sold and the sales price for those units on a monthly basis; (b) total revenue that you derived from such sales; (c) total costs of such sales, including incremental costs; (d) name and address of the person to whom those products were sold based on how the sale was booked by NVIDIA; (e) name and address of the person that paid for those products based on NVIDIA's receipt of payment; (f) name and address of the person to whom those products were delivered; (g) name and address of the end customer; and (h) projected number of units to be sold and the projected sales price for those units on a monthly or quarterly basis.

ANSWER TO INTERROGATORY NO. 6

NVIDIA objects to this interrogatory on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to this interrogatory on the grounds that it is overly broad as to time. NVIDIA objects to this interrogatory on the grounds that it seeks information regarding products that are outside the scope of this case. NVIDIA objects to this interrogatory on the ground that it is overly broad, unduly burdensome and compound. NVIDIA objects to this interrogatory to the extent it seeks information that is neither relevant, nor reasonably calculated to lead to the discovery of admissible evidence. NVIDIA objects to this interrogatory on the grounds that it seeks information that are outside NVIDIA's possession, custody and control or that is not maintained in the ordinary course of business. NVIDIA objects to this interrogatory to the extent that it seeks disclosure of confidential information from third parties that NVIDIA is under an

obligation not to disclose. NVIDIA will disclose such information subject to any required third party consent or permission and pursuant to the Protective Order to be entered in this case.

NVIDIA objects to this interrogatory to the extent it requires disclosure of information regarding specific customers of any products. NVIDIA objects to this interrogatory to the extent that it seeks to elicit information subject to and protected by the attorney-client privilege, the attorney work product doctrine, joint defense or common interest privilege and/or any other applicable privileges, protections, or immunities. NVIDIA objects to this interrogatory on the ground that the term “NVIDIA Accused Product” is overly broad, unduly burdensome, vague and ambiguous. NVIDIA further objects to this interrogatory to the extent it seeks financial information in a form not held by NVIDIA. NVIDIA objects to this interrogatory to the extent it seeks disclosure of confidential information from third parties that NVIDIA is under an obligation not to disclose. NVIDIA objects to this interrogatory as to the terms and phrases “total costs,” “incremental costs” “name and address of the person to whom those products were sold based on how the sale was booked by NVIDIA” “name and address of the person that paid for those products based on NVIDIA’s receipt of payment,” “name and address of the person to whom those products were delivered,” “name and address of the end customer,” and “projected number of units to be sold and the projected sales price for those units on a monthly or quarterly basis.” NVIDIA specifically objects to these subparts as separate interrogatory requests. NVIDIA objects to this interrogatory on the grounds that it is premature in view of the timetable set forth in the Scheduling Order. *See* D.I. 25.

Subject to and without waiving the foregoing general and specific objections, NVIDIA responds as follows:

Pursuant to F.R.C.P. 33(d), NVIDIA will produce non-privileged, responsive documents to Plaintiffs, from which certain information that is responsive to this interrogatory may be derived or ascertained according to the Scheduling Order, within a reasonable period of time following the service of Plaintiffs' sufficient identification of accused products and subject to a suitable protective order and an ESI protocol agreed upon by the parties.

Discovery is just beginning and NVIDIA reserves the right to supplement or amend this interrogatory as additional information is known.

INTERROGATORY NO. 7

Separately for each of the Asserted Patents, describe in detail when you first became aware of such Asserted Patent, including the date, the circumstances, and who was involved or has knowledge thereof. Include in your response the identity of each document that supports your answer or to which you referred in preparing your answer.

ANSWER TO INTERROGATORY NO. 7

NVIDIA objects to this interrogatory on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein. NVIDIA objects to this interrogatory on the ground that it is overly broad, unduly burdensome and compound. NVIDIA objects to this interrogatory to the extent it seeks information that is neither relevant, nor reasonably calculated to lead to the discovery of admissible evidence. NVIDIA objects to this interrogatory to the extent that it seeks to elicit information subject to and protected by the attorney-client privilege, the attorney work product doctrine, joint defense or common interest privilege and/or any other applicable privileges, protections, or immunities. NVIDIA objects to this interrogatory to the extent it seeks information that NVIDIA is under an

Dated: August 29, 2019

Of Counsel:

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CERTIFICATE OF SERVICE

I, Brian A. Biggs, hereby certify that on this 29th day of August, 2019, I caused a true and correct copy of the foregoing **DEFENDANT NVIDIA CORPORATION'S RESPONSES AND OBJECTIONS TO PLAINTIFFS' FIRST SET OF INTERROGATORIES (Nos. 1–14)** to be sent to the following counsel of record via electronic mail:

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Exhibit 7

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October 1, 2019

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Refers to Material Designated by
NVIDIA as Confidential Pursuant to
Delaware L.R. 26.2

**Re: *Invensas Corp. et al. v. NVIDIA Corp.*, C.A. No. 19-00861-
RGA (D. Del.)**

Dear Mark:

We write regarding certain deficiencies in NVIDIA's objections and responses to Plaintiffs' first set of interrogatories (nos. 1–14) and first set of requests for production (nos. 1–114), served by NVIDIA on August 29. Plaintiffs reserve their right to challenge other deficiencies in NVIDIA's objections and responses beyond those addressed in this letter.

I. First Set of Interrogatories

A. Interrogatory No. 1

Plaintiffs' interrogatory no. 1 seeks the following information regarding each '231/'946 Accused Product: "(a) the semiconductor device short product number (e.g., GM206); (b) the semiconductor device extended product number (e.g., GM206-300-A1); (c) the NVIDIA microarchitecture name (e.g., Maxwell); (d) any internal names or code names for the product; (e) the foundry that fabricated the product and the technology node (e.g., TSMC 28nm); (f) the design rules used to fabricate the product; and (g) the name of each and every NVIDIA Downstream Product into which the semiconductor device has been incorporated (e.g., GeForce GTX960)." In response, NVIDIA has provided two tables listing some, but not all, of the requested information.

1. Extended Product Numbers

Although NVIDIA's tables provide various product family names such as "GM206," the tables do not provide extended product numbers that identify products more specifically. NVIDIA contends that the phrase "extended product number" is "vague, ambiguous, overly broad, and unduly burdensome," but this objection is not well taken because Plaintiffs have already provided NVIDIA with an example of an extended product number apparently used by NVIDIA ("GM206-300-A1"). Additionally, NVIDIA has not offered any support for its

COVINGTON

Mark D. Fowler
October 1, 2019
Page 2

conclusory assertion that providing these extended product numbers for each of the '231/'946 Accused Products would be unduly burdensome. Plaintiffs need this information to assist with their review of technical documentation and financial data that Plaintiffs expect NVIDIA will produce. Accordingly, please confirm that NVIDIA will supplement its response to interrogatory no. 1 to provide an extended product number for each of the '231/'946 Accused Products.

2. *Internal Names or Code Names*

The tables provided by NVIDIA in response to interrogatory no. 1 do not provide any internal names or code names unique to individual '231/'946 Accused Products. NVIDIA asserts a conclusory objection that the phrase "internal names or code names" is "vague, ambiguous, overly broad and unduly burdensome," but NVIDIA does not substantiate this objection. Additionally, we disagree with NVIDIA's position that "internal names or code names" is vague or ambiguous. The request is self-explanatory. If NVIDIA uses internal names or code names to identify the '231/'946 Accused Products in its documents, then Plaintiffs are entitled to discover this information to assist with their review of NVIDIA's technical documentation and financial data. Accordingly, please confirm that NVIDIA will supplement its response to interrogatory no. 1 to provide any internal names or code names associated with each of the '231/'946 Accused Products.

3. *Design Rules*

NVIDIA's response to interrogatory no. 1 does not identify the design rules associated with the '231/'946 Accused Products. NVIDIA asserts a conclusory objection that the phrase "design rules" is "vague, ambiguous, overly broad and unduly burdensome," but NVIDIA does not substantiate this objection. Design rules refer to rules provided by a fabricator that impose limitations on the layout of a chip. Plaintiffs anticipate that NVIDIA will include design rules for TSMC's 40 nm, 28 nm, 20 nm, and 16 nm technology nodes with NVIDIA's production of core technical documents for the '231/'946 Accused Products. Plaintiffs need this documentation to further investigate NVIDIA's infringement of the '231 and '946 patents. Please confirm that NVIDIA will (1) produce design rules associated with the '231/'946 Accused Products in its production of core technical documents and (2) supplement its response to interrogatory no. 1 to identify these documents.

4. *Downstream Products*

Plaintiffs requested the name of each and every NVIDIA Downstream Product into which each '231/'946 Accused Product has been incorporated. For example, the accused NVIDIA GM206-300-A1 chip appears to have been incorporated into the NVIDIA GeForce GTX960 graphics card. NVIDIA's response to interrogatory No. 1 does not provide any information regarding any Downstream Product. NVIDIA asserts a conclusory objection that the phrase "NVIDIA Downstream Product" is "overly broad as to scope and unduly burdensome," but NVIDIA does not substantiate this objection. Plaintiffs disagree with NVIDIA's contention that discovery regarding downstream products that incorporate accused NVIDIA chips is overly broad. Plaintiffs need this information to further investigate NVIDIA's infringement of the '231 and '946 patents. Accordingly, please confirm that NVIDIA will supplement its response to

COVINGTON

Mark D. Fowler
October 1, 2019
Page 3

interrogatory no. 1 to identify any NVIDIA Downstream Products that incorporate any of the '231/'946 Accused Products.

B. Interrogatory No. 2

Plaintiffs' interrogatory no. 2 seeks the following information regarding each '005 Accused Product: "(a) the semiconductor device short product number (e.g., GP100); (b) the semiconductor device extended product number (e.g., GP100-892-A1); (c) any internal names or code names for the product; (d) the NVIDIA microarchitecture name (e.g., Pascal); (e) the package type (e.g., BGA); (f) the foundry that fabricated the product and the technology node (e.g., TSMC 16nm); (g) the supplier of the high bandwidth memory stack (if any); and (h) the name of each and every NVIDIA Downstream Product into which the semiconductor device has been incorporated (e.g., Tesla P100)." In response, NVIDIA has provided a table listing some, but not all, of the requested information.

1. Extended Product Numbers; Internal Names or Code Names; Downstream Products

NVIDIA's response to interrogatory no. 2 does not provide extended product numbers, internal names, or code names for the '005 Accused Products. Additionally, NVIDIA's response to interrogatory no. 2 does not provide any information regarding any Downstream Product. For the reasons explained above in connection with interrogatory no. 1, please confirm that NVIDIA will also supplement its response to interrogatory no. 2 to provide (1) an extended product number for each of the '005 Accused Products, (2) any internal names or code names associated with each of the '005 Accused Products, and (3) an identification of any NVIDIA Downstream Products that incorporate any of the '005 Accused Products.

2. Package Type

The table provided by NVIDIA in response to interrogatory no. 2 does not identify the package type of each of the '005 Accused Products. NVIDIA asserts a conclusory objection that the phrase "package type" is "vague, ambiguous, overly broad and unduly burdensome," but NVIDIA does not substantiate this objection. Additionally, we disagree with NVIDIA's position that "package type" is vague or ambiguous. NVIDIA itself has described the package type of NVIDIA products.¹ Plaintiffs need this information to further investigate NVIDIA's infringement of the '005 Patent. Accordingly, please confirm that NVIDIA will supplement its response to interrogatory no. 2 to identify the package type of each of the '005 Accused Products.

¹ See, e.g., "Inside Pascal: NVIDIA's Newest Computing Platform" by Mark Harris on *NVIDIA Developer Blog* (Apr. 5, 2016), available at <http://devblogs.nvidia.com/inside-pascal> ("The combination of HBM2 stacks, GPU die, and silicon interposer are packaged in a single 55mm x 55mm BGA package.").

COVINGTON

Mark D. Fowler
 October 1, 20196T
 Page 4

3. *Supplier of High Bandwidth Memory Stack*

The table provided by NVIDIA in response to interrogatory no. 2 does not identify the supplier of high-bandwidth memory stacks used in each of the '005 Accused Products. NVIDIA asserts a conclusory objection that the phrase “high bandwidth memory stack” is “vague, ambiguous, overly broad and unduly burdensome,” but NVIDIA does not substantiate this objection. Additionally, we disagree with NVIDIA’s position that “high bandwidth memory stack” is vague or ambiguous. NVIDIA itself has promoted its use of high bandwidth memory stacks in its products.² Plaintiffs need this information to further investigate NVIDIA’s infringement of the '005 Patent. Accordingly, please confirm that NVIDIA will supplement its response to interrogatory no. 2 to identify the supplier of high-bandwidth memory stacks used in each of the '005 Accused Products.

C. Interrogatory No. 3

Plaintiffs’ interrogatory no. 3 seeks the following information regarding each '333 Accused Product: “(a) the product name (e.g., Tesla K10 Server Accelerator Card); (b) any internal names or code names for the product; (c) the supplier(s) of the substrate; (d) a specific identification of each material that makes up the substrate (e.g., core, buildup layers, traces, etc.); (e) the supplier(s) of the circuit board; (f) a specific identification of each material that makes up the circuit board (e.g., core, buildup layers, traces, etc.); and (g) the entity that assembled the product (including by attaching the package to the circuit board).”

NVIDIA’s response to interrogatory no. 3 does not identify any products or list any of the information requested by the interrogatory. Instead, NVIDIA’s response states that “[c]ertain information relating to the products identified in Plaintiffs’ Complaint for U.S. Patent No. 6,317,333 can be ascertained from NVIDIA’s response to Interrogatory No. 1.” NVIDIA’s response is inadequate.

First, the fact that “certain information” responsive to interrogatory no. 3 can be located in NVIDIA’s response to interrogatory no. 1 does not excuse NVIDIA from providing the information requested by interrogatory no. 3. Interrogatory nos. 1 and 3 pertain to different patents with different specifications, and for that reason they seek different information. For example, interrogatory no. 3—unlike interrogatory no. 1—requests both the supplier of the substrate used with the relevant accused products, and the identity of materials used in the substrate. NVIDIA cannot refrain from providing this information simply because NVIDIA has provided other information in response to interrogatory no. 1.

Second, NVIDIA’s response to interrogatory no. 3 improperly narrows the scope of NVIDIA’s response to only “the products identified in Plaintiffs’ Complaint for U.S. Patent No. 6,317,333.” However, as reflected in the complaint, Plaintiffs’ infringement allegations are not

² See, e.g., “Inside Pascal: NVIDIA’s Newest Computing Platform” by Mark Harris on *NVIDIA Developer Blog* (Apr. 5, 2016), available at <http://devblogs.nvidia.com/inside-pascal> (“Tesla P100 is the first GPU accelerator to use High Bandwidth Memory 2 (HBM2). . . . A passive silicon interposer is . . . used to connect the memory stacks and the GPU die.”)

COVINGTON

Mark D. Fowler
October 1, 20196T
Page 5

limited to only the specific products identified in the complaint as infringing the '333 Patent. Plaintiffs' infringement allegations also encompass "all NVIDIA products that are substantially similar" to the specific products identified in the complaint as infringing the '333 Patent. D.I. 1 ¶ 76. Additionally, Plaintiffs defined the term "'333 Accused Product" as used in interrogatory no. 3 as follows:

The terms "'333 Accused Product" and "'333 Accused Products" refer to any product comprising an NVIDIA semiconductor device in a ball grid array (BGA) substrate package mounted to a circuit board, and where the product was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and April 16, 2018, whether or not incorporated into a Downstream Product. The terms "'333 Accused Product" and "'333 Accused Products" encompass, without limitation, the Tesla K10 Server Accelerator Card, the Grid K2 Graphics Card, and MSI's GeForce GTX 750.

Consistent with Plaintiffs' allegations in the complaint, this definition encompasses NVIDIA products that are substantially similar to the specific products identified in the complaint.

In its response to interrogatory no. 3, NVIDIA objects to the term "'333 Accused Products" as "overly broad as to scope and unduly burdensome," and to the extent it seeks "information regarding products that are outside the scope of this case." NVIDIA's objection as to scope is unfounded. NVIDIA semiconductor devices in BGA substrate packages mounted to circuit boards are substantially similar to the NVIDIA products specifically identified in the complaint. Accordingly, these products are within the scope of this case. NVIDIA's objection as to any purported undue burden is entirely conclusory and unsupported, and thus the objection does not justify NVIDIA's failure to provide the information requested by interrogatory no. 3.

Plaintiffs need the information requested in interrogatory no. 3 to further investigate NVIDIA's infringement of the '333 Patent. In light of the foregoing, please confirm that NVIDIA will supplement its response to provide the requested information.

D. Interrogatory No. 4

Plaintiffs' interrogatory no. 4 seeks the following information regarding each '046 Accused Product: "(a) the semiconductor device short product number (e.g., GK107); (b) the semiconductor device extended product number (e.g., N13E-GE-A2); (c) any internal names or code names for the product; (d) the associated circuit schematic; and (e) the name of each and every NVIDIA Downstream Product into which the semiconductor device has been incorporated."

NVIDIA's response to interrogatory no. 4 does not identify any products or list any of the information requested by the interrogatory. Instead, NVIDIA's response states that "[c]ertain information relating to the products identified in Plaintiffs' Complaint for U.S. Patent No.

COVINGTON

Mark D. Fowler
October 1, 20196T
Page 6

5,666,046 can be ascertained from NVIDIA's response to Interrogatory No. 1." As with interrogatory no. 3, NVIDIA's response to interrogatory no. 4 is inadequate.

First, the fact that "certain information" responsive to interrogatory no. 4 can be located in NVIDIA's response to interrogatory no. 1 does not excuse NVIDIA from providing the information requested by interrogatory no. 4. Interrogatory nos. 1 and 4 pertain to different patents with different specifications, and for that reason they seek different information. For example, interrogatory no. 4—unlike interrogatory no. 1—requests circuit schematics for the relevant accused products. NVIDIA cannot refrain from providing this information simply because NVIDIA has provided other information in response to interrogatory no. 1.

Second, NVIDIA's response to interrogatory no. 4 improperly narrows the scope of NVIDIA's response, this time to only "the products identified in Plaintiffs' Complaint for U.S. Patent No. 5,666,046." As reflected in the complaint, Plaintiffs' infringement allegations are not limited to only the specific products identified in the complaint as infringing the '046 Patent. Plaintiffs' infringement allegations also encompass "all NVIDIA products that are substantially similar" to the specific products identified in the complaint as infringing the '046 Patent. D.I. 1 ¶ 91. Additionally, Plaintiffs defined the term "'046 Accused Product" as used in interrogatory no. 4 as follows:

The terms "'046 Accused Product" and "'046 Accused Products" refer to any NVIDIA product comprising a semiconductor device that includes a reference voltage circuit and was fabricated for NVIDIA using TSMC's 40nm, 28nm, 20nm, or 16nm technology node, where the product was made, used, offered for sale, or sold within the United States or imported into the United States by any person or entity between May 8, 2013 and August 24, 2015, whether or not incorporated into a Downstream Product. The terms "'046 Accused Product" and "'046 Accused Products" encompass, without limitation, the Kepler GK107 GPU and Tegra 3 SoC.

Consistent with Plaintiffs' allegations in the complaint, this definition encompasses NVIDIA products that are substantially similar to the specific products identified in the complaint.

In its response to interrogatory no. 4, NVIDIA objects to the term "'046 Accused Products" as "overly broad as to scope and unduly burdensome," and to the extent it seeks "information regarding products that are outside the scope of this case." NVIDIA's objection as to scope is unfounded. NVIDIA products comprising semiconductor devices that include reference voltage circuits are substantially similar to the NVIDIA products specifically identified in the complaint. Accordingly, these products are within the scope of this case. NVIDIA's objection as to any purported undue burden is entirely conclusory and unsupported, and thus the objection does not justify NVIDIA's failure to provide the information requested by interrogatory no. 4.

COVINGTON

Mark D. Fowler
October 1, 2019
Page 7

Plaintiffs need the information requested in interrogatory no. 4 to further investigate NVIDIA's infringement of the '046 Patent. In light of the foregoing, please confirm that NVIDIA will supplement its response to provide the requested information.

E. Interrogatory No. 5

Plaintiffs' interrogatory no. 5 asks NVIDIA to identify on an annual basis, for each Top 10 NVIDIA Customer, "each Downstream Product manufactured and/or sold by that Top 10 NVIDIA Customer, including without limitation the brand name, model name, product number, or other identifier of each such Downstream Product and an identification of each and every document that reflects such information." The term "Top 10 NVIDIA Customer" means any entity for which the worldwide unit volume of sales by NVIDIA to that entity on an annual basis (or for the May-December time period for 2013) placed that entity as one of NVIDIA's Top 10 customers worldwide by unit volume of sales.

NVIDIA's response to interrogatory no. 5 is inadequate. NVIDIA's response does not provide, or agree to provide, any of the specific information that Plaintiffs have requested. NVIDIA's response states only that NVIDIA will produce documents from which "certain information" responsive to the interrogatory may be derived. As with its other interrogatory responses, NVIDIA does not describe what this "certain information" will or will not contain.

NVIDIA asserts several objections to interrogatory no. 5, including (among others) objections as to breadth and scope. As to breadth and scope, interrogatory no. 5 is a proper request given the large number of infringing products created by NVIDIA and sold by NVIDIA to its customers, as reflected in the numerous exemplary infringing products specifically identified in the complaint. Furthermore, the breadth and scope of interrogatory no. 5 is reasonable because it is limited to the top 10 customers. Discovering the identity of NVIDIA's top 10 customers will assist Plaintiffs in further focusing their discovery requests in this case, both as to NVIDIA and as to potential non-parties who may possess discoverable information.

Additionally, NVIDIA objects to interrogatory no. 5 on the grounds that the terms and phrase "Top 10 NVIDIA Customer," "Downstream Product," and "other identifier of each such Downstream Product" are vague, ambiguous, overly broad, and unduly burdensome. As explained above, we disagree with NVIDIA's position that interrogatory no. 5 is overly broad. As to NVIDIA's position that interrogatory no. 5 is unduly burdensome, NVIDIA provides no substantiation for this contention. NVIDIA's conclusory and unsubstantiated objection based upon undue burden does not justify NVIDIA's failure to provide the requested information. We also disagree with NVIDIA's position that the terms and phrases are vague or ambiguous. If NVIDIA proposes alternative definitions for these terms, then please provide us with those definitions.

NVIDIA also objects to interrogatory no. 5 to the extent that the interrogatory "requires disclosure of information regarding specific customers of any products." We disagree with NVIDIA's objection. At a minimum, NVIDIA's objection is overly broad because information regarding specific customers of accused products sold by NVIDIA is plainly relevant to this case. Please confirm that NVIDIA withdraws this objection. If NVIDIA maintains this objection, then please provide us with legal authority supporting NVIDIA's position.

COVINGTON

Mark D. Fowler
October 1, 2019
Page 8

To reduce the burden on NVIDIA and to lessen the scope of any discovery disputes, Plaintiffs are willing to remove from interrogatory no. 5 their request that NVIDIA identify “each and every document that reflects” the information requested by interrogatory no. 5. Accordingly, please confirm that NVIDIA agrees to provide the information requested by interrogatory no. 5, subject to the narrowing revision described in the preceding sentence.

F. Interrogatory No. 6

Plaintiffs’ interrogatory no. 6 asks NVIDIA to identify various specific financial, shipment, and forecasting data for each NVIDIA Accused Product.

NVIDIA’s response does not provide any of the requested information but represents that NVIDIA will produce documents “from which certain information that is responsive to this interrogatory may be derived or ascertained.” As explained above in connection with interrogatory no. 5, NVIDIA’s vague reference to “certain information” does not provide an adequate response to the interrogatory.

NVIDIA’s response further represents that NVIDIA will produce the aforementioned “certain information” within “a reasonable period of time following the service of Plaintiffs’ sufficient identification of accused products.” In view of this representation, Plaintiffs reserve their right to challenge NVIDIA’s response to interrogatory no. 6 following NVIDIA’s production of this information.

G. Interrogatory No. 7

Plaintiffs’ interrogatory no. 7 asks NVIDIA to describe in detail, for each of the Asserted Patents, “when you first became aware of such Asserted Patent, including the date, the circumstances, and who was involved or has knowledge thereof. Include in your response the identity of each document that supports your answer or to which you referred in preparing your answer.”

NVIDIA’s response provides some but not all of the information requested in interrogatory no. 7. Among other things, NVIDIA’s response fails to identify anyone who was involved or has knowledge of NVIDIA’s first awareness of the ’946, ’231, ’333, or ’046 patents. Such individuals must exist, given NVIDIA’s admission that it was made aware of these patents long before Plaintiffs filed their complaint.

Plaintiffs need this information to further investigate NVIDIA’s pre-suit awareness of the Asserted Patents. Accordingly, please confirm that NVIDIA will supplement its response to interrogatory no. 7 to identify “who was involved or has knowledge” of NVIDIA’s first awareness of the Asserted Patents.

H. Interrogatory No. 13

Plaintiffs’ interrogatory no. 13 asks NVIDIA to, for “each proposed, offered, or executed license to intellectual property or technology of which you are aware that concerns or relates to the NVIDIA Accused Products or that you contend is relevant to the calculation of a reasonable

COVINGTON

Mark D. Fowler
October 1, 2019
Page 9

royalty for any one of the Asserted Patents, identify the proposed, offered, or executed license and all related documents, describe (on a quarter-by-quarter basis) any payments or receipts pursuant to such license, and indicate which, if any, such license you contend is relevant to the calculation of a reasonable royalty for the Asserted Patents.”

NVIDIA’s response to interrogatory no. 13 is inadequate. NVIDIA’s response does not provide any of the requested information. NVIDIA’s response states that it will “disclose an expert report on damages describing in detail each factor that NVIDIA alleges should be used in any damages calculation,” but NVIDIA does not otherwise agree to provide any information in response to interrogatory no. 13 prior to service of NVIDIA’s expert report on damages.

NVIDIA’s reference to its forthcoming expert report on damages does not justify its failure to provide any information in response to interrogatory no. 13. NVIDIA’s expert report on damages is not due until more than a year from now, on February 12, 2021, and Plaintiffs’ expert report on damages is due before they will receive NVIDIA’s expert report. D.I. 25 ¶ 10. Plaintiffs are entitled, at a minimum, to discover from NVIDIA—during the fact discovery period—each executed license to intellectual property or technology of which NVIDIA is aware that concerns or relates to the NVIDIA Accused Products, as well as payments and receipts related to such licenses. Providing at least this information during the fact discovery period does not require NVIDIA to provide an expert report on damages prior to NVIDIA’s expert report deadline. Furthermore, Plaintiffs need this information from NVIDIA to support Plaintiffs’ calculation of the proper measure of damages for NVIDIA’s infringement of the asserted patents.

Accordingly, please confirm that NVIDIA will supplement its response to interrogatory no. 13 to at least identify each executed license to intellectual property or technology of which NVIDIA is aware that concerns or relates to the NVIDIA Accused Products, as well as payments and receipts related to such licenses.

II. First Set of Requests for Production

NVIDIA’s objections and responses to Plaintiffs’ first set of requests for production raise several issues that warrant a telephonic meet and confer, including:

- NVIDIA stated that it is willing to meet and confer with Plaintiffs to determine a mutually agreeable scope of production, if any, with respect to request nos. 4, 14, 22, 31, 45, 61, 62, 64, 78, 80, 81, 82, 83, 84, 85, 86, 87, 88, and 89. Plaintiffs believe these requests are clear on their face, but are willing to engage in a discussion with NVIDIA regarding these requests.
- NVIDIA appears to stand on its objections with respect to request nos. 50, 51, 52, 65, 66, 67, 68, 69, and 77. Plaintiffs request an explanation from NVIDIA for why it does not intend to provide discovery in response to these requests.
- In response to various requests calling for documents concerning NVIDIA’s sales and financial records, including request nos. 41, 42, 46, 47, 48, 59, and 79, NVIDIA stated that it will produce documents “sufficient to show summary of

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Mark D. Fowler
October 1, 2019
Page 10

sales information as kept in the ordinary course of business for the products specifically accused of infringement that were sold for shipment into the United States during the relevant time period in its possession, custody or control, that can be located after a reasonable search.” Plaintiffs request a detailed explanation from NVIDIA regarding the sales data that it intends to produce, including an explanation regarding the meaning of the phrase “sold for shipment into the United States.”

- It appears that NVIDIA has unreasonably narrowed the apparent scope of its planned production of documents in response to request nos. 9, 25, 26, 33, 35, 91, 92, 93, 94, 101, 104–109, 113, and 114. Plaintiffs intend to engage in a discussion with NVIDIA regarding these requests.

As noted previously, Plaintiffs reserve their right to raise additional deficiencies in NVIDIA’s objections and responses to Plaintiffs’ first set of requests for production. We are available to meet-and-confer regarding the issues raised in this letter on Friday, October 4. Please confirm your availability.

Sincerely,

A handwritten signature in blue ink, appearing to read "Tom Garten", with a stylized flourish extending to the right.

Tom Garten

cc: Counsel of Record

Exhibit 8

From: [Garten, Thomas E](#)
To: [Williamson, Carrie](#); [NVIDIA-Tessera-DLA](#); [Fowler, Mark](#)
Cc: [Xperi-NVIDIA](#); [Brian Farnan](#); [Michael J. Farnan](#)
Subject: RE: Invenas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Date: Wednesday, October 16, 2019 6:48:40 AM

Carrie,

Thank you meeting and conferring with Plaintiffs on Oct. 14 to discuss issues raised in Plaintiffs' Oct. 1 deficiency letter. Below is a summary of the issues that we discussed. If anything in the summary is not accurate, please let me know promptly. Additionally, because we did not conclude our discussion of issues related to Plaintiffs' requests for production, please provide NVIDIA's availability this week for a follow-up call. You informed me that you would do this yesterday.

As I mentioned during the call, Plaintiffs' position is that NVIDIA should supplement its interrogatory responses by the end of next week—*i.e.*, by Fri. Oct. 25—to address the deficiencies raised in Plaintiffs' Oct. 1 deficiency letter. If any deficiencies remain after Oct. 25, we intend to contact the Court to pursue a resolution.

Plaintiffs' First Set of Interrogatories

- Extended Product Numbers. Plaintiffs' position is that identification of extended product numbers is relevant to establishing infringement, at least for so long as there is no signed representative products stipulation between the parties. NVIDIA's position is that identifying extended product numbers is not relevant, because the technical documentation is maintained at the product family-level (e.g., GF101). You said that you would investigate whether NVIDIA is willing to provide extended product numbers for the accused products. As I have said multiple times, including as early as the July 31 Rule 26(f) conference, Plaintiffs are more than willing to enter into a written stipulation on representative products. We await your response.
- Code Names. Plaintiffs' position is that NVIDIA should identify prerelease code names associated with each of the accused products, to the extent any exist. You represented that the family-level code names in NVIDIA's responses to interrogatories nos. 1 and 2 constitute a good-faith list of code names and that NVIDIA does not have any additional code names to identify at this time.
- Downstream Products. You represented that NVIDIA will supplement its responses to identify NVIDIA downstream products, as requested by the interrogatories. You said that you need to check with your client to determine when NVIDIA will be able to do this.
- Interrogatory No. 1: Design Rules ('941/'236 Patents). You represented that NVIDIA will produce design rules as part of its core technical document production due on Nov. 21, 2019. (Dkt. 25 ¶ 3(b)(ii).) You further represented that NVIDIA tentatively agrees to identify design rule documents as requested by interrogatory no. 1, subject to an agreement by Plaintiffs to identify documents in response to interrogatories propounded by NVIDIA.
- Interrogatory No. 2: Package Type ('005 Patent). You represented that NVIDIA will supplement its interrogatory response to identify the package type for the accused products.
- Interrogatory No. 2: HBM Supplier ('005 Patent). Plaintiffs' position is that the HBM stack is

relevant to the '005 Patent because it provides one of the "plurality of device chips" as recited in the preamble of claim 1, for example. Because the HBM stack is relevant to NVIDIA's infringement of the '005 Patent, the identity of the supplier of the HBM stack is also relevant. Plaintiffs have a need to learn now the identities of suppliers of HBM stacks to NVIDIA because Plaintiffs may wish to seek discovery from the suppliers, and the suppliers may be located overseas, which could require additional time for discovery. You said that you did not understand why the HBM stack is relevant. You said that you would provide Plaintiffs' explanation of relevance to NVIDIA and see if NVIDIA is willing to identify the companies that supply it with HBM stacks.

- Interrogatory No. 3 ('333 Patent). As noted in Plaintiffs' deficiency letter of Oct. 1, NVIDIA's Aug. 31 response to interrogatory no. 3 does not identify any products or list any of the information requested by the interrogatory. We ask that you supplement your response to identify the accused products.
 - o During our meet and confer, you stated that NVIDIA intends to produce documents containing information requested by interrogatory no. 3 when NVIDIA serves its core technical document production by Nov. 21, 2019. Plaintiffs' position is that the core technical document production deadline does not relieve NVIDIA of its obligation to provide a response to interrogatory no. 3, which Plaintiffs served on NVIDIA eleven weeks ago on July 30, 2019. Similar to the issue with the HBM stacks and the '005 Patent, Plaintiffs have a need to learn now the identity of suppliers to NVIDIA of substrates and circuit boards that are used in the '333 Accused Products, as well as the identity of the entities that assemble these components to create the '333 Accused Products. Plaintiffs may wish to seek discovery from these suppliers and assemblers, many of which may be located overseas.
 - o In response to Plaintiffs' position, you stated that NVIDIA is collecting and reviewing documents, and that you would investigate whether NVIDIA can respond to interrogatory no. 3 with the names of the suppliers. Plaintiffs reiterate that they need supplier and assembler information soon (well before Nov. 21), and that this information does not constitute core technical documentation that is not due until Nov. 21.
- Interrogatory No. 4 ('046 Patent). As noted in Plaintiffs' deficiency letter of Oct. 1, NVIDIA's Aug. 31 response to interrogatory no. 4 does not identify any products or list any of the information requested by the interrogatory. You confirmed that NVIDIA's production of core technical documentation will include circuit schematics. You also said that you are checking with NVIDIA regarding a supplemental response for interrogatory no. 4 that identifies specific products. You also confirmed that NVIDIA will supplement its response to interrogatory no. 4 to identify NVIDIA downstream products.
- Interrogatory No. 5 (Top 10 NVIDIA Customers). You represented that NVIDIA is still investigating and considering its response to interrogatory no. 5. Plaintiffs' position is that NVIDIA should remedy its deficient interrogatory response through supplementation by Oct. 25, 2019.

- Interrogatory No. 6 (Financial Data). You represented that NVIDIA is working on preparing a spreadsheet that will provide detailed financial information and that NVIDIA expects to produce soon. You indicated that this spreadsheet would contain quarterly unit and revenue information. You could not state whether it would also include the information called for by subparts (d)-(g), but noted that you would discuss this with your client.
- Interrogatory No. 7 (First Awareness). You confirmed that NVIDIA will supplement its response to interrogatory no. 7 to identify “who was involved or has knowledge” of NVIDIA’s first awareness of the asserted patents.
- Interrogatory No. 13 (Licenses). You represented that NVIDIA is investigating the information requested by interrogatory no. 13 and that until NVIDIA completes this investigation, NVIDIA is not in a position to describe what it will provide in a supplemental response. Plaintiffs reiterated that, as an initial matter, NVIDIA should produce the executed licenses that pertain to the accused products.

Plaintiffs' First Set of Requests for Production

- "Sold for Shipment into the United States." As noted in Plaintiffs' deficiency letter of Oct. 1, NVIDIA stated in response to request nos. 41, 42, 46, 47, 48, 59, and 79 that it will produce documents “sufficient to show summary of sales information as kept in the ordinary course of business for the products specifically accused of infringement that were sold for shipment into the United States during the relevant time period in its possession, custody or control, that can be located after a reasonable search.” Plaintiffs' deficiency letter of Oct. 1 requested a detailed explanation from NVIDIA regarding the sales data that it intends to produce, including an explanation regarding the meaning of the phrase “sold for shipment into the United States.” During our meet and confer call, you were not able to describe the criteria NVIDIA is applying to its data to determine what does or does not constitute a sale “for shipment into the United States.” You stated that you understand Plaintiffs' request for an explanation of the criteria. Please provide Plaintiffs with this information.
- Additional RFPs. The parties agreed to schedule another call to continue discussing the issues identified in Plaintiffs' Oct. 1 deficiency letter. As we discussed, please provide time(s) for a follow-up call this week.

Best regards,
Tom

From: Garten, Thomas E
Sent: Sunday, October 13, 2019 10:03 AM
To: Williamson, Carrie ; NVIDIA-Tessera-DLA ; Fowler, Mark
Cc: Xperi-NVIDIA ; Brian Farnan ; Michael J. Farnan
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Carrie: We'll speak with you on Monday 10/14 at 1:00 PM PT. I will circulate a conference line.
Best regards,
Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>
Sent: Friday, October 11, 2019 10:36 AM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]
Tom,
We aren't available during those times. We can be available on Monday sometime between 11am – 2:30pm PT.
Thanks,
Carrie

From: Garten, Thomas E <tgarten@cov.com>
Sent: Wednesday, October 9, 2019 6:50 AM
To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Carrie: We are available from 2:30 - 6:00 PM Pacific on Thursday 10/10 or 2:30 - 4:30 PM Pacific on Friday 10/11. Please select a time.
Thanks,
Tom

From: Garten, Thomas E <tgarten@cov.com>
Sent: Saturday, October 05, 2019 5:15 AM
To: Williamson, Carrie <carrie.williamson@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Thank you, Carrie. We do expect NVIDIA to be prepared to meet and confer before the close of next week. Please provide some time slots for the call.
Best regards,
Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>
Sent: Thursday, October 03, 2019 5:35 PM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Tom,

With respect to your request to meet and confer regarding the issues in your October 1 letter, we are still reviewing and investigating issues in your letter and will get back with you regarding a time to meet and confer next week.

Regards,

Carrie

From: Garten, Thomas E <tgarten@cov.com>

Sent: Tuesday, October 1, 2019 8:24 PM

To: NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence

[EXTERNAL]

Counsel: Please see the attached correspondence regarding deficiencies in NVIDIA's responses to Plaintiffs' first set of interrogatories and document requests.

Best regards,

Tom

Thomas Garten

Covington & Burling LLP

3000 El Camino Real, 5 Palo Alto Square, 10th Floor

Palo Alto, CA 94306-2112

T +1 650 632 4708 | tgarten@cov.com

www.cov.com

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Exhibit 9

From: Williamson, Carrie
To: [Garten, Thomas E](#); [NVIDIA-Tessera-DLA](#); [Fowler, Mark](#)
Cc: [Xperi-NVIDIA](#); [Brian Farnan](#); [Michael J. Farnan](#)
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Date: Wednesday, October 30, 2019 11:57:17 AM

[EXTERNAL]

Tom,

I understand your Delaware team members have reached out to our Delaware team members to call the court regarding a discovery dispute and have threatened to call the court unilaterally.

As my emails below state, we do not understand what “dispute” exist between the parties. You did not respond to my email.

I further understand this morning Brian Farnan provided the following identification to only our Delaware team members regarding issues Plaintiffs intend to raise with the court:

“The issues that we intend to raise with the Court concern Defendant's failure to provide a timely response with respect to:

- Interrogatory No. 1: (a) extended product numbers, (b) additional code names (if any), and (c) downstream products.
- Interrogatory No. 2: (a) extended product numbers, (b) additional code names (if any), (c) package type, (d) HBM supplier, and (e) downstream products.
- Interrogatory No. 3: (a) product name; (b) internal code names (if any), (c) supplier of the substrate, (d) each material in the substrate, (e) supplier of the circuit board, (f) each material in the circuit board, and (g) entity that assembled the product.
- Interrogatory No. 4: (a) short product number, (b) extended product number, (c) code names (if any), and (d) downstream products.
- Interrogatory No. 5: Wholly deficient.
- Interrogatory No. 6: Wholly deficient.
- Interrogatory No. 7: Identify persons who were "involved or has knowledge" about the subject matter.
- Interrogatory No. 13: Wholly deficient.”

Merely stating a “failure to provide a timely response” does not identify a dispute nor does it identify any basis for moving to compel, particularly given that we agreed to provide (or already did provide) information as reflected in the parties’ reflections of the meet and confer correspondence.

Moreover, as I stated last week during our meet and confer, we expect to provide certain supplemental responses this week. I further stated in my October 25 communication to you that we are willing to discuss a reasonable date certain for supplementation. Plaintiffs have refused to engage in that discussion.

As I stated during our meet and confer, most of these interrogatories seek information that is reflected or contained in NVIDIA core technical documents or reflect financial information arising from identification of accused products, including what plaintiffs refer to as “NVIDIA downstream products.” This is not something that can be done within the 11 days requested by Plaintiffs, who on October 14 unilaterally demanded supplemental responses to 8 interrogatories on October 25.

NVIDIA will supplement its responses to Interrogatory Nos. 1-6 and 13 on November 27, which is 4 business days following NVIDIA’s core technical document production. NVIDIA will further supplement certain of those interrogatories (including Interrogatory No. 7) this week. We trust this resolves any purported “dispute” regarding Plaintiffs’ complaint regarding NVIDIA’s purported “failure to provide a timely response.”

Finally, we have been asking for 2 weeks to meet and confer regarding Plaintiffs’ discovery responses. Plaintiffs have refused to meet and confer. To the extent Plaintiffs seek court involvement regarding discovery disputes, NVIDIA will also seek relief from the court.

Regards,
Carrie

From: Williamson, Carrie

Exhibit 10

From: Ouchida, Laurie
To: [Xperi-NVIDIA](#)
Cc: [NVIDIA-Tessera-DLA](#)
Subject: NVIDIA/Invensas - 11/27/19 - NVIDIA's Suppl. Responses & Objections to Plaintiffs' 1st Set of Interrogatories (Nos. 1-5, 13) (**Restricted/Outside AEO Only***)
Date: Wednesday, November 27, 2019 2:11:04 PM
Attachments: [2019.11.27 - NVIDIA's Suppl Resps & Objs to Plaintiffs' 1st Set of Interrogs \(1-5, 13\) - Restricted - Outside Attys Eyes Only.pdf](#)

[EXTERNAL]

Attached please find Defendant Nvidia Corporation's Supplemental Responses and Objections to Plaintiffs' First Set of Interrogatories (Nos. 1-5, 13).

NVIDIA is continuing to prepare its financial spreadsheets for production in this litigation and will soon supplement its response to Interrogatory No. 6. Given the number of products and the scope of the financial information over an extended period of time, the preparation of the financial reports is unfortunately taking longer than expected.

Best regards,

Laurie Ouchida

Case Manager

T +1 650.833.2113

F +1 650.833.2001

E laurie.ouchida@us.dlapiper.com



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Exhibit 11

From: [Garten, Thomas E](#)
 To: [Kraft, Denise](#); [Brian Farnan](#); [Michael J. Farnan](#); [Xperi-NVIDIA](#)
 Cc: [Williamson, Carrie](#); [Fowler, Mark](#); [NVIDIA-Tessera-DLA](#)
 Subject: RE: Invenas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
 Date: Thursday, December 05, 2019 11:36:28 PM

Counsel for NVIDIA:

We write regarding ongoing deficiencies in NVIDIA's responses to Plaintiffs' first set of interrogatories. As the record below reflects, Plaintiffs have made clear the various ways in which NVIDIA's interrogatory responses are deficient. Unfortunately, NVIDIA's November 27, 2019 supplemental interrogatory responses, served at NVIDIA's insistence on the eve of Thanksgiving, did not cure many of these deficiencies. The ongoing deficiencies include:

- **Interrogatory No. 2:** The supplemental response remains deficient for the reasons raised by Plaintiffs previously, including most recently on November 14. NVIDIA's response merely states that [REDACTED] and that [REDACTED]. Please associate the supplier of HBM for *each* accused product model (e.g., by associating the supplier with each NVIDIA GP100 and GV100 NVIDIA Chip NVPN). The information NVIDIA has provided hardly goes beyond the disclosure in NVIDIA's 2019 10-K at page 9, [REDACTED].
- **Interrogatory No. 3:** More than 4 months after NVIDIA was served with this interrogatory, NVIDIA still has not identified *any* accused part numbers -- instead stating that "[i]nformation responsive to this interrogatory is identified in the charts provided in Interrogatory No. 1." This is a non-response. The information provided in response to Interrogatory No. 1 is not sufficient for Plaintiffs to discern each and every '333 Accused Product (per Plaintiffs' definition of that term), at least because the response to Interrogatory No. 1 does not identify the package type of each product identified in the charts. NVIDIA also has not provided the information called for in subparts (c)-(g) of the interrogatory. We identified these deficiencies two months ago, and most recently on November 14. The documents identified by NVIDIA, pursuant to Rule 33(d), do not appear to be responsive to the interrogatory ([REDACTED]). Further, pointing to source code folders SC000002 and SC000004, without more specificity, does not comply with Rule 33(d). *See, e.g., Power Integrations, Inc. v. Fairchild Semiconductor, Int'l, Inc.*, 2005 WL 8136574, at *1 (D. Del. Oct. 11, 2005).
- **Interrogatory No. 4:** NVIDIA's supplemental response does not associate a circuit schematic (e.g., by file name or other similar designation) with each GPU and SOC product, as called for by subpart (d). Pointing to source code folder SC000003\tessera, without more specificity, does not comply with Rule 33(d). *See, e.g., Power Integrations*, 2005 WL 8136574, at *1.
- **Interrogatory No. 5:** On November 6, 2019, NVIDIA promised "to identify its top customers and their products to the extent NVIDIA has the information." On November 14, Plaintiffs indicated that such a response would be deficient. The interrogatory does not seek a listing of "top customers" generally, but rather calls for an identification of the Downstream Products sold by NVIDIA's Top 10 Customers on an annual basis. NVIDIA's supplemental response merely lists ten "NVIDIA Corp." customers. It does not identify the Top 10 Customers on an annual basis, nor does it identify any Downstream Products. NVIDIA has

simply made no real effort to provide the requested information. The identification of top customers on an annual basis should be available in NVIDIA's financial database and the Downstream Product information would be known to NVIDIA's sales teams, which operate to achieve "design-wins" with respect to specific products. Indeed, some of this information is provided on NVIDIA's website. *See, e.g.,* <https://www.nvidia.com/en-us/data-center/tesla/tesla-qualified-servers-catalog/>.

• **Interrogatory No. 6:** On November 6, 2019, NVIDIA stated that it would "supplement this interrogatory to provide unit and revenue information and [] to provide COGS as the information as held in the ordinary course of business. We can provide this information by November 27." Then, on November 27, NVIDIA failed to supplement Interrogatory No. 6, stating that "[g]iven the number of products and the scope of the financial information over an extended period of time, the preparation of the financial reports is unfortunately taking longer than expected" and that NVIDIA would supplement "soon." Thus, Plaintiffs still have no response to this interrogatory 4 months after it was served.

• **Interrogatory No. 13:** NVIDIA's supplemental response identified three license agreements. As we advised by email on November 14, limiting the production to agreements that "cover[] the relevant accused functionalities for the asserted patents" is unduly restrictive. NVIDIA has provided no justification for this restriction. As set forth in Plaintiffs' October 1 letter, and as discussed during the October 14 telephone call, Plaintiffs' position is that -- as an initial matter -- NVIDIA must produce the executed licenses that pertain to the accused products. This would include at least the following license agreements (originals and renewals):

- o Samsung: <https://nvidianews.nvidia.com/news/nvidia-and-samsung-agree-to-settle-all-outstanding-ip-litigation-6622432>
- o Intel: <https://nvidianews.nvidia.com/news/intel-to-pay-nvidia-technology-licensing-fees-of-1-5-billion>
- o Polaris: <http://www.wilan.com/news/news-releases/news-release-details/2019/WiLAN-Subsidiary-Polaris-Signs-License-Agreement-with-NVIDIA/default.aspx>
- o Rambus: <https://www.rambus.com/rambus-and-nvidia-sign-patent-license-agreement-2/>, <https://www.law360.com/articles/307685/rambus-inks-patent-licensing-deal-with-nvidia>
- o Fast Logic: <https://www.alliacense.com/nvidia-purchases-fast-logic-portfolio-license-2/>

In addition, NVIDIA should produce materials related to its own GPU licensing campaign, which launched in 2013, including NVIDIA's proposed royalty rates and any license agreements reached as a result of that campaign. *See, e.g.,* <https://www.cnet.com/news/nvidia-to-license-its-graphics-technology-to-device-makers/>; <https://www.fool.com/investing/general/2013/12/29/nvidias-gpu-licensing-plan-is-clever.aspx>.

Given that these deficiencies have been outstanding now for some time, and Plaintiffs worked diligently over the past two months in an attempt to resolve these disputes, we expect NVIDIA to cure each one of the deficiencies above in a supplemental response to be provided on Wednesday, December 11. We are generally available on Monday, December 9 for a meet-and-confer involving Delaware counsel. If the deficiencies are not cured, we intend to raise each one of the issues above with the Court.

Best regards,
Tom

From: Garten, Thomas E

Sent: Thursday, November 14, 2019 6:07 PM

To: Kraft, Denise ; Brian Farnan ; Michael J. Farnan ; Xperi-NVIDIA

Cc: Williamson, Carrie ; Fowler, Mark ; NVIDIA-Tessera-DLA

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence Carrie and Denise:

As the record demonstrates, we have been forced to move toward contacting the Court in order to extract any meaningful information from NVIDIA regarding (a) the timing of NVIDIA's proposed supplementation, and (b) the content of NVIDIA's proposed supplementation. Thank you for finally providing *some* of this information in your November 6 email.

First, let me point out that NVIDIA's November 1, 2019 supplemental responses to Interrogatory Nos. 2-4 did little to cure the deficiencies in NVIDIA's responses to those interrogatories. This was not "significant supplementation," as described in Denise's email.

- **Interrogatory No. 2:** NVIDIA merely stated that [REDACTED]
[REDACTED]
[REDACTED] Please associate the supplier of HBM for *each* accused product model (e.g., by indicating the extended part number). The information NVIDIA has provided hardly goes beyond the disclosure in NVIDIA's 2019 10-K at page 9, [REDACTED]
[REDACTED]
- **Interrogatory No. 3:** NVIDIA still has not identified *any* accused part numbers -- instead stating that "certain" GPUs identified in response to Interrogatory No. 1 might also be responsive to Interrogatory No. 3. This is a non-response. The list of substrate suppliers, which are not associated with any particular products, also is deficient. NVIDIA has simply identified the same broad list of suppliers that are disclosed in NVIDIA's 10-K filings. Finally, the list of entities that "assembled the packaged chip" (i.e., OSATs) is non-responsive to the interrogatory, which calls for an identification of each entity that "assembled the product (including by attaching the package to the circuit board)." It also does not associate any entity with any particular product. We expect to make this identification for *each* product and the entity listed should be the party that handles assembly of the chip package to the board.
- **Interrogatory No. 4:** NVIDIA has now supplemented to identify product families (by copying and pasting information from the August 29 response to Interrogatory No. 1). The response remains deficient as to subparts (b), (d), and (e). I address these below.

We expect the deficiencies above to be cured in NVIDIA's November supplementation. Please confirm.

With regard to the November supplementation, we understand that NVIDIA intends to supplement its responses to Interrogatory Nos. 1-6 and 13 on November 27. (You have not responded to my request that NVIDIA avoid supplementing on the eve of Thanksgiving and instead serve the supplemental responses on November 25. I renew that request here.) We respond below to the information that you have now supplied regarding the substance of your planned supplementation.

- **Interrogatory Nos. 1-4:** NVIDIA has not fully responded to the concerns raised in Plaintiffs' October 31 email. We understand, based on the meet and confer, that NVIDIA will provide

extended part numbers and any additional code names in response to Interrogatory Nos. 1, 2, and 4. NVIDIA has not responded to Plaintiffs' request for confirmation that the November supplementation will also include an identification of the information below. Please do so.

- o For Interrogatory No. 1, the design rules used to fabricate each product.
- o For Interrogatory No. 2, the package type and high bandwidth memory supplier for each product.
- o For Interrogatory No. 3, the supplier of the substrate and each material in the substrate, the supplier of the circuit board and each material in the circuit board, and the entity that assembled each product.
- o For Interrogatory No. 4, the circuit schematic associated with each product.
- **Interrogatory No. 5:** NVIDIA has merely agreed "to identify its top customers and their products to the extent NVIDIA has the information." The interrogatory does not seek a listing of "top customers" generally, but rather calls for an identification of the Downstream Products sold by NVIDIA's Top 10 Customers on an annual basis. We find it hard to believe that this information is difficult to gather, given that the identification of top customers on an annual basis should be available in NVIDIA's financial database and the Downstream Product information would be known to NVIDIA's sales teams, which operate to achieve "design-wins" with respect to specific products. What exactly is it that you intend to provide in your supplementation?
- **Interrogatory No. 6:** Thank you for confirming that NVIDIA will supplement to provide unit, revenue, and COGS for each accused product, as well as any sales projection data located at the time of supplementation. The information called for in subparts (d)-(g) is relevant to, among other things, whether the sale is made in the USA and NVIDIA's liability for induced infringement. I explained this during our October 14 telephone conference and you agreed to check with your client thereafter. What is NVIDIA's position?
- **Interrogatory No. 13:** Thank you for confirming that NVIDIA will identify and produce patent license agreements. Limiting the production to agreements that "cover[]the relevant accused functionalities for the asserted patents" is unduly restrictive. On what basis is NVIDIA proposing this restriction? As set forth in Plaintiffs' October 1 letter, and as discussed during the October 14 telephone call, Plaintiffs' position is that -- as an initial matter -- NVIDIA must produce the executed licenses that pertain to the accused products.

The discussion above demonstrates why NVIDIA's vague promises to supplement interrogatory responses are not productive. The purpose of Plaintiffs' October 31 email was to identify precisely what NVIDIA does or does not intend to provide in its supplemental responses. We seek to do so once again now and look forward to your response.

Best regards,
Tom

From: Kraft, Denise <denise.kraft@dlapiper.com>

Sent: Wednesday, November 06, 2019 9:22 AM

To: Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Garten, Thomas E <tgarten@cov.com>; Xperi-NVIDIA <xperi-nvidia@cov.com>

Cc: Williamson, Carrie <carrie.williamson@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Brian, Michael and Tom

To follow up on Carrie's email below, it is premature to call the Court "to have a hearing date on calendar" for an unripe dispute. It is a misuse of Court resources, and it completely circumvents the plain language of Local Rule 7.1.1 and the Court's discovery dispute procedure. Local Rule 7.1.1 requires the parties make a reasonable effort to reach agreement—the correspondence below shows that NVIDIA is attempting in good faith to reach agreement, but Plaintiffs are not. It also requires "oral communication that involves Delaware counsel," yet Plaintiffs seek to rush to the Court without attempting to hold a further communication involving Delaware counsel. Since the last meet and confer there has been significant supplementation by NVIDIA and offers to further supplement by a date certain. To meet the "reasonable effort" requirement of the Local Rule, the parties at a minimum will need to hold a further telephonic meet and confer involving Delaware counsel.

The Court's Scheduling Order further states "[s]hould **counsel** find **they** are unable to resolve a discovery matter . . . **the parties involved** in the discovery matter . . . shall contact the Court's Case Manager to schedule an in-person conference/argument." D.I. 15, ¶ 3(h). NVIDIA continues to attempt to resolve the discovery disputes, including through offers to supplement by a date certain, so we do not have agreement that we are "unable to resolve a discovery matter." Moreover, the Court's order does not permit *ex parte* calls to schedule the discovery dispute conference. On the current record and until we have a further oral communication, Plaintiffs do not have our authority to call the Court to schedule a teleconference. The dispute is not ripe, and calling the Court at this stage is a violation of the Local Rules and the Court's Schedule. If Plaintiffs insist on calling the Court *ex parte*, Plaintiffs' counsel must make clear during that call that Plaintiffs have refused to have an oral meet and confer involving Delaware counsel, that NVIDIA is attempting in good faith to resolve the dispute, that NVIDIA has offered to supplement, and that NVIDIA objects to putting "a hearing date on calendar" when the dispute is not ripe.

Best

Denise

From: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>

Sent: Wednesday, November 6, 2019 12:11 PM

To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence Tom,

Your e-mail does not accurately reflect the status of the parties' discussion. You claim that NVIDIA states that "in nearly every case NVIDIA has merely said it is investigating." This is directly contradicted by your own October 16 email reflecting the parties' meet and confer discussion and what NVIDIA agreed, even as of October 16, to supplement. Even more troubling, you state that you "**believe it is best** to have a hearing date on calendar to address *the discovery disputes*." To be clear, Plaintiffs have not identified any discovery disputes, as we told you that we would provide supplementation to the interrogatories for which you had raised issues and we would provide that supplementation by November 27. Furthermore, it is improper and in violation of the spirit of the Court's requirements regarding meeting and conferring to resolve genuine discovery disputes to unilaterally call the court and seek a hearing date because you "believe it is best" to have a "hearing date on calendar." By your own admission and as reflected in the communications below, Plaintiffs cannot claim that counsel are "unable to resolve a discovery matter" as required by the Scheduling Order 3.h or that a "reasonable effort has been made to reach

agreement with the opposing party” per LR 7.1.1.

On Thursday, October 31, you asked for a response in writing to your October 31 meet and confer e-mail. I told you on Monday, November 4 (just 2 business days later) that we would respond in writing to your e-mail by Thursday, November 7 (within one week of your request). I further notified you that we could discuss these issues verbally prior to November 7. I again asked you on November 5 to identify a time to discuss the issues. Your e-mail below states that your Delaware counsel has asked our Delaware team members to identify a time to call the court on the morning of Wednesday, November 6 or your Delaware counsel will call the court unilaterally.

I have repeatedly stated that I do not understand what discovery dispute you are attempting to bring to the court. This confusion is even more pronounced given that we have already agreed to supplement our responses by November 27. **To be clear, because NVIDIA agreed to supplement its interrogatory responses and has since provided supplemental responses for certain interrogatories on November 1, the parties have not yet met and conferred regarding a dispute as required by LR 7.1.1, which requires oral communication involving Delaware counsel.** As such, we reserve the right to move to strike any premature letter briefing and move for fees/costs under FRCP 37.

In response to your October 31 request for further clarification regarding what NVIDIA’s supplemental responses will contain, we provide the following information.

For Interrogatory Nos. 1-4, we already addressed these issues through meet and confer and I confirm again that to the extent that NVIDIA is in possession of the information, NVIDIA will supplement Interrogatory Nos. 1-4 by November 27 to provide the information. As we previously discussed, our initial responses already provided a good faith identification of code names.

With respect to Interrogatory No. 5, NVIDIA has been investigating and continues to investigate the information it possesses regarding the products of its top customers. There is significant burden trying to identify and collect this information; it is not merely information that can be collected from a single database. To further complicate matters, the information further varies by customer. On November 27, NVIDIA will supplement its response to identify its top customers and their products to the extent NVIDIA has the information. For example, based on its current investigation, NVIDIA may not have “brand name” or “model names” for customers’ products but may have non-uniform information that identifies the type of product sold.

With respect to Interrogatory No. 6, as reflected in the meet and confer correspondence, we previously agreed to supplement this interrogatory to provide unit and revenue information and further agreed to provide COGS as the information as held in the ordinary course of business. We can provide this information by November 27. With respect to Plaintiffs’ request regarding projections of sales, sales and price projection information is not kept in the same location as financial information and is much more piecemeal. As a result, NVIDIA is continuing its lengthy investigation into where and how projection information is kept. Again, the burden of identifying and collecting this information is significant and will take additional time, but to the extent that NVIDIA can locate this information in a reasonable manner, NVIDIA will provide the information. Finally, with respect to Plaintiffs’ request for names and address for bookings, payments, delivery and end customer, NVIDIA is willing to discuss with Plaintiffs providing information (as held by NVIDIA in its ordinary course of business) as it relates to NVIDIA’s top customers. Plaintiffs have not articulated the relevancy of this information and have inexplicably stonewalled any further meet confer.

With respect to Interrogatory No. 13, NVIDIA agrees to identify and produce patent license agreements covering the relevant accused functionalities for the asserted patents, and NVIDIA’s supplemental response will identify these patent license agreements, subject to any notice requirements required prior to production of these patent license agreements. As Plaintiffs are well aware (as it has not produced its own patent license agreements), notice is typically required prior to production of patent license agreements.

I trust this resolves any perceived disputes. If you have questions or concerns, we are willing to continue discussing the interrogatory responses.

Finally, I note the Plaintiffs continue to entirely refuse to meet and confer regarding NVIDIA’s discovery to Plaintiffs while seeking to impose a unilateral, accelerated discovery schedule on NVIDIA. We repeat our request for a time to meet and confer regarding Plaintiffs’ discovery responses – a request we have been making for three weeks yet Plaintiffs have refused to meet and confer once, let alone agree to supplement any discovery responses. Again, to the extent that Plaintiffs seek court intervention, we will similarly so seek to address Plaintiffs’ refusal to engage in

the meet and confer process.

Regards,

Carrie

From: Garten, Thomas E <tgarten@cov.com>

Sent: Tuesday, November 5, 2019 6:43 PM

To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Carrie: We asked for you to tell us whether you would be curing the deficiencies raised in our Oct. 1 letter in your proposed November supplementation. You have not responded. We would like to receive your response in writing, specifying exactly what your proposed November supplementation will include. Without that information, we cannot agree to your proposal. I understand you may be providing that written response on November 7. Please confirm. It is simply inaccurate for you to suggest that these issues have "already been addressed through our previous meet and confer," given that in nearly every case NVIDIA has merely said that it is investigating the information and will provide some (unspecified) supplementation after the deadline for service of NVIDIA's core technical document production. We believe it is best to have a hearing date on calendar to address the discovery disputes, which have now been unresolved for more than a month. I believe Mr. Farnan has already reached out to your Delaware counsel to obtain such a date.

Best regards,

Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>

Sent: Wednesday, November 06, 2019 9:52 AM

To: Williamson, Carrie <carrie.williamson@dlapiper.com>; Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Tom,

I would appreciate the courtesy of a response to my email. Please let me know when we will be having the further discussion requested in my email below.

Regards,

Carrie

From: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>

Sent: Monday, November 4, 2019 2:50 PM

To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Tom,

Plaintiffs' arbitrary deadlines and threats are not well taken, particularly as Plaintiffs seek to impose a discovery schedule of its own making on NVIDIA while dragging its feet by refusing entirely to engage in timely meet and confer regarding Plaintiffs' own discovery responses. We would be happy to continue discussing the issues in your email when we meet and confer regarding Plaintiffs' responses to NVIDIA's discovery to Plaintiffs, preferably in the next day or two. Alternatively, we will provide a written responses to your email below by November 7 addressing the issues in your email below (almost all of which have already been addressed through our previous meet and confer). It is entirely unacceptable that Plaintiffs have refused for over half a month (and continue to refuse) to meet and confer regarding NVIDIA's discovery. Specifically, we have been asking to meet and confer since our October 16 letter. It is now past November 1 - the date by which we asked Plaintiffs to provide its supplemental responses to NVIDIA's interrogatories, and Plaintiffs have failed to meet and confer regarding its discovery responses even *once* as of today.

In contrast, NVIDIA has already committed to provide supplemental responses to Plaintiffs' discovery to NVIDIA and further committed to a date to provide supplemental responses to the interrogatories you raise. Furthermore, NVIDIA already provided initial supplemental responses to four of Plaintiffs' interrogatories on Friday, and NVIDIA expects to provide further supplemental responses to Interrogatory Nos. 2-4 on November 27.

Should Plaintiffs wish to prematurely involve the court in discovery disputes, we will be raising Plaintiffs' discovery deficiencies and its refusal to meet and confer with NVIDIA at the same time.

Regards,

Carrie

From: Garten, Thomas E <tgarten@cov.com>

Sent: Monday, November 4, 2019 4:31 AM

To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Carrie: We have not heard from you on this. Without any assurances regarding the information that NVIDIA intends to provide in the November supplemental responses, we will simply need to raise the issue with the Court. Let us know your availability for such a call on Tuesday, 11/5. If you cannot make time on that day, then we will simply call the Court unilaterally. (Please note: we do not believe that the 11/1 supplemental responses to Interrogatory Nos. 2-4 address the deficiencies raised below.)

Best regards,

Tom

From: Garten, Thomas E <tgarten@cov.com>

Sent: Thursday, October 31, 2019 10:47 PM

To: Williamson, Carrie <carrie.williamson@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J.

Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
My apologies: There were a couple of items that I inadvertently omitted in my email below, which are added in red text. Thanks.

From: Garten, Thomas E

Sent: Thursday, October 31, 2019 10:42 PM

To: 'Williamson, Carrie' <carrie.williamson@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Carrie,

As you know, the dispute is that NVIDIA has not provided meaningful, substantive responses to nearly all of our interrogatories, despite the fact that those responses were due two months ago. Your email below suggests that NVIDIA did not even commence gathering responsive information until we raised deficiencies. It was not until we were on the verge of calling the court unilaterally -- because, after 48 hours, NVIDIA had not responded to our invitations for a joint call -- that we received a firm date by which NVIDIA would agree to supplement its responses to Interrogatory Nos. 1-6 and 13.

We cannot agree to this proposal until we understand what those supplemental responses will contain. I do not want to be in a position where we are expecting one thing in a supplemental response and receiving something that falls short of our expectations. Accordingly, please let us know:

- Interrogatory No. 1: Will NVIDIA provide (a) extended product numbers, (b) additional code names (if any), (c) the design rules used to fabricate each product, and (d) downstream products for every '231/'946 Accused Product?
- Interrogatory No. 2: Will NVIDIA provide (a) extended product numbers, (b) additional code names (if any), (c) package type, (d) HBM supplier, and (e) downstream products for every '005 Accused Product?
- Interrogatory No. 3: Will NVIDIA provide (a) product name; (b) internal code names (if any), (c) supplier of the substrate, (d) each material in the substrate, (e) supplier of the circuit board, (f) each material in the circuit board, and (g) entity that assembled the product for every '333 Accused Product?
- Interrogatory No. 4: Will NVIDIA provide (a) short product number, (b) extended product number, (c) code names (if any), (d) the associated circuit schematic for each product, and (e) downstream products for every '046 Accused Product?
- Interrogatory No. 5: Will NVIDIA identify, on an annual basis for each Top 10 NVIDIA Customer, each Downstream Product manufactured and/or sold by the Top 10 NVIDIA Customer, including the brand name, model name, product number, or other such identifier?
- Interrogatory No. 6: Will NVIDIA provide, separately for each NVIDIA Accused Product from May 8, 2013 to the present, the financial data called for in subparts (a)-(h) of the interrogatory (to the extent that information is maintained in the ordinary course of NVIDIA's business)?
- Interrogatory No. 13: Will NVIDIA at least produce and identify each patent license agreement that covers any one of the NVIDIA Accused Products?

These are effectively the questions that we presented to you a month ago. If there is some piece of information above that NVIDIA will not be providing in its proposed November supplemental responses, then please let us know by COB Friday. Finally, we would appreciate not receiving your supplement on the eve of Thanksgiving. Would you please adjust your proposed supplementation to November 22?

We look forward to receiving NVIDIA's supplemental response to Interrogatory No. 7 this week. I will respond in our separate email chain regarding Plaintiffs' responses to NVIDIA's interrogatories and RFPs.

Best regards,
Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>

Sent: Thursday, October 31, 2019 3:55 AM

To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Tom,

I understand your Delaware team members have reached out to our Delaware team members to call the court regarding a discovery dispute and have threatened to call the court unilaterally.

As my emails below state, we do not understand what “dispute” exist between the parties. You did not respond to my email.

I further understand this morning Brian Farnan provided the following identification to only our Delaware team members regarding issues Plaintiffs intend to raise with the court:

“The issues that we intend to raise with the Court concern Defendant's failure to provide a timely response with respect to:

- Interrogatory No. 1: (a) extended product numbers, (b) additional code names (if any), and (c) downstream products.
- Interrogatory No. 2: (a) extended product numbers, (b) additional code names (if any), (c) package type, (d) HBM supplier, and (e) downstream products.
- Interrogatory No. 3: (a) product name; (b) internal code names (if any), (c) supplier of the substrate, (d) each material in the substrate, (e) supplier of the circuit board, (f) each material in the circuit board, and (g) entity that assembled the product.
- Interrogatory No. 4: (a) short product number, (b) extended product number, (c) code names (if any), and (d) downstream products.
- Interrogatory No. 5: Wholly deficient.
- Interrogatory No. 6: Wholly deficient.
- Interrogatory No. 7: Identify persons who were "involved or has knowledge" about the subject matter.
- Interrogatory No. 13: Wholly deficient.”

Merely stating a “failure to provide a timely response” does not identify a dispute nor does it identify any basis for moving to compel, particularly given that we agreed to provide (or already did provide) information as reflected in the parties’ reflections of the meet and confer correspondence.

Moreover, as I stated last week during our meet and confer, we expect to provide certain supplemental responses this week. I further stated in my October 25 communication to you that we are willing to discuss a reasonable date certain for supplementation. Plaintiffs have refused to engage in that discussion.

As I stated during our meet and confer, most of these interrogatories seek information that is reflected or contained in NVIDIA core technical documents or reflect financial information arising from identification of accused products,

including what plaintiffs refer to as “NVIDIA downstream products.” This is not something that can be done within the 11 days requested by Plaintiffs, who on October 14 unilaterally demanded supplemental responses to 8 interrogatories on October 25.

NVIDIA will supplement its responses to Interrogatory Nos. 1-6 and 13 on November 27, which is 4 business days following NVIDIA’s core technical document production. NVIDIA will further supplement certain of those interrogatories (including Interrogatory No. 7) this week. We trust this resolves any purported “dispute” regarding Plaintiffs’ complaint regarding NVIDIA’s purported “failure to provide a timely response.”

Finally, we have been asking for 2 weeks to meet and confer regarding Plaintiffs’ discovery responses. Plaintiffs have refused to meet and confer. To the extent Plaintiffs seek court involvement regarding discovery disputes, NVIDIA will also seek relief from the court.

Regards,
Carrie

From: Williamson, Carrie

Sent: Monday, October 28, 2019 2:12 PM

To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Tom,

Your October 28 email does not accurately reflect the parties’ discussions or NVIDIA’s positions regarding its interrogatory responses and is in fact contradicted by your own summary of the meet and confer discussion. NVIDIA is not “avoiding responding” to Plaintiffs’ interrogatories in any shape or form.

I have now told you at least three different time (October 14, 22, and 25) that NVIDIA does not understand what dispute(s) you understand remain between the parties and I have repeatedly asked you to identify each purported dispute and any bases for moving with respect to each alleged dispute. Please provide that itemized list in writing. It is entirely insufficient to point to your October 1 letter as the identification of the disputes as per your own reflection of the discussion, NVIDIA has already agreed to supplement. In fact, for certain requests you asked NVIDIA to confirm that it would include certain information *as part of its core technical document production*, which NVIDIA agreed to do. As such, you owe us an indication of the purported deficiencies Plaintiffs believe remain for each interrogatory following the meet and confer discussion.

Finally, per my email below, please provide a time to meet and confer on Tuesday or Wednesday of this week regarding my October 16 letter. To date Plaintiffs have refused to meet and confer regarding Plaintiffs’ specific responses to NVIDIA’s discovery requests. To the extent you continue to refuse to meet and confer, we will have no choice but to seek the Court’s assistance.

Regards,
Carrie

From: Garten, Thomas E <tgarten@cov.com>

Sent: Monday, October 28, 2019 6:42 AM

To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Carrie,
Substantive responses to Plaintiffs’ first set of interrogatories were due on August 30. Nearly two

months later, NVIDIA's interrogatories remain deficient for the reasons outlined in our October 1 correspondence. In most cases, NVIDIA has merely stated that it is "investigating" the subject matter called for by the interrogatory. And in the few instances where NVIDIA has agreed to provide a supplemental response (e.g., extended product numbers, downstream products, a detailed financial spreadsheet), it has failed to identify a date by which Plaintiffs will receive the supplementation. We are not aware of any rule that would allow NVIDIA to avoid responding to interrogatories seeking basic information that NVIDIA admits is within its possession, custody, and control simply because this case is in the early stages or because NVIDIA has yet to make its core technical document production. Plaintiffs' September 23 identification of accused products does not excuse NVIDIA's delay -- as you know, nearly all of the products identified in that disclosure were first identified in our detailed complaint filed ***almost six months ago*** on May 9, 2019.

As I advised you on October 14, we intend to raise NVIDIA's deficient interrogatory responses with the Court. We will ask that the Court compel NVIDIA to promptly cure each one of the deficiencies outlined in our October 1 correspondence. We will be reaching out to NVIDIA's Delaware counsel to make the phone call to the Court.

Best regards,

Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>

Sent: Saturday, October 26, 2019 9:32 AM

To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence

[EXTERNAL]

Tom,

Thank you for your email reflecting Plaintiffs' understanding of our October 14 meet and confer. The following is our understanding of that meet and confer, along with the relevant portion of the October 22 meet and confer.

First and foremost, during our October 14 meet and confer, Plaintiffs communicated for the first time their demand that by October 25 (just 11 days following the first meet and confer discussion regarding NVIDIA's interrogatory responses), NVIDIA must supplement its interrogatory responses for the eight interrogatories discussed in Plaintiffs' October 1, 2019 letter or Plaintiffs threaten to go the court. As we told you on October 14 and repeated during an October 22 meet and confer discussing Plaintiffs' requests for production, Plaintiffs' selection of October 25 as a unilaterally-imposed "deadline" for NVIDIA to supplement interrogatory responses is arbitrary and unsupported by the Court's scheduling order and case schedule. Plaintiffs have offered no explanation why any specific information is needed by October 25 (almost a month prior to the deadline to produce core technical documents for the accused products). Indeed, discovery is just beginning and does not close for another approximately 14 months (December 10, 2020) and the deadline to substantially complete document production is in approximately 10 months (August 19, 2020).). Most importantly, there has been no impasse on any discovery issue to date. Indeed, your own e-mail reflecting the parties' meet and confer discussion does not allege that there is any dispute. I further told you on both October 14 and 22 that I do not understand what dispute you understand there to be between the parties and prior to contacting the court, Plaintiffs need to specifically identify any

dispute and any bases for moving. Furthermore, as I stated, NVIDIA will provide supplemental interrogatory responses as indicated through our meet and confer but Plaintiffs' demand for supplementation by October 25 is unreasonable.

As we stated during the meet and confer, NVIDIA has been identifying and collecting core technical documents for the massive number of accused products to produce on or before November 21 (per the Court's Scheduling Order). Plaintiffs provided its identification of accused products on September 23 and just eight days later complained about the sufficiency of 8 of NVIDIA's interrogatory responses, where at least 6 of the 8 interrogatories seek extensive detailed technical and financial information regarding those accused products. Notably, as Plaintiffs acknowledge in their own October 1 discovery letter, information requested in some of the interrogatories is identified in the core technical documents (*e.g.*, "Please confirm that NVIDIA will (1) produce design rules associated with the '231/'946 Accused Products in its production of core technical documents and (2) supplement its response to interrogatory no. 1 to identify these documents.") NVIDIA continues to identify and collect core technical documents and financial information regarding the accused products and other information responsive to these interrogatory responses and will provide supplemental responses in a reasonable time period. If you would like to have a further discussion about what is a reasonable time period, we are willing to do so.

As to specific points discussed during meet and confer, I address these issues below.

- With respect to extended product numbers, as I stated during our October 22 meet and confer, NVIDIA will provide extended part numbers to the extent it has them, is in the process of collecting that information and will supplement its interrogatory responses with these part numbers in a reasonable time (likely near the time of the core technical document production). With respect to Plaintiffs' request that the parties enter into a representative product agreement, any representative product agreement is premature prior to core technical document production.
- With respect to NVIDIA downstream products as requested in Interrogatory Nos. 1, 2 and 4, we agreed to supplement to identify these products. As you are aware, given the number of NVIDIA downstream products, this takes significant time and work.
- With respect to the identity of suppliers of the HBM stack, thank you for providing this additional explanation regarding the purported relevance of the supplier of the HBM stack. During our meet and confer Plaintiffs did not articulate their position that the HBM stack is relevant to the '005 Patent because it provides one of the "plurality of device chips" as recited in the preamble of claim 1. We are discussing Plaintiffs' newly-articulated position with NVIDIA.
- With respect to Interrogatory Number 3 ('333 Patent), as discussed during our meet and confer, information Plaintiffs request (including identification of products at a consumer/retail level, the substrate suppliers, identification of materials making up substrate, product assembler, PCB supplier, and identification of PCB materials) comes from technical documents that are part of NVIDIA's core technical document production. NVIDIA is working to identify the names of at least the substrate suppliers and assemblers in a supplemental interrogatory response in approximately the next week.
- With respect to Interrogatory Number 13 (Licenses), as discussed during our meet and confer, we are still investigating the scope of the licenses requested in this interrogatory. Given the large number of accused products, this investigation takes time. Further, this interrogatory seeks damages contentions that involve expert opinion (*i.e.*, "license . . . you contend is

relevant to the calculation of a reasonable royalty for any one of the Asserted Patents,").

NVIDIA will provide an update regarding its position with respect to this request. Notably, Plaintiffs have not yet produced its license agreements for the Asserted Patents. Furthermore, as you are well-aware, production of licenses frequently requires that notice be provided to third parties prior to production of licenses, as Plaintiffs purport to point to a notice period to justify its failure to produce its license agreements.

- With respect to the phrase "Sold for Shipment into the United States" as used in certain of NVIDIA's responses to Plaintiffs' requests for production, we provided this explanation to you on October 14 and provided further explanation on October 22. We further stated that we would be producing a spreadsheet reflecting these sales, and you stated that you would review the spreadsheet upon production and decide whether you had further questions.
- We discussed certain of Plaintiffs' requests for production on October 22 during meet and confer, and Plaintiffs had to cut short that meet and confer. We understand that you will reach out to us if you would like to further discuss any of those issues.
- We are still waiting for Plaintiffs to provide a time to meet and confer to address the deficiencies NVIDIA has raised with Plaintiffs' discovery responses. We asked you to meet and confer on October 22 regarding those deficiencies, and you were unwilling to meet and confer regarding those specific issues at that time. Please provide a time to meet and confer regarding those deficiencies on Tuesday, October 29 or Wednesday, October 30.

Regards,
Carrie

From: Garten, Thomas E <tgarten@cov.com>

Sent: Wednesday, October 16, 2019 6:49 AM

To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Carrie,

Thank you meeting and conferring with Plaintiffs on Oct. 14 to discuss issues raised in Plaintiffs' Oct. 1 deficiency letter. Below is a summary of the issues that we discussed. If anything in the summary is not accurate, please let me know promptly. Additionally, because we did not conclude our discussion of issues related to Plaintiffs' requests for production, please provide NVIDIA's availability this week for a follow-up call. You informed me that you would do this yesterday.

As I mentioned during the call, Plaintiffs' position is that NVIDIA should supplement its interrogatory responses by the end of next week—*i.e.*, by Fri. Oct. 25—to address the deficiencies raised in Plaintiffs' Oct. 1 deficiency letter. If any deficiencies remain after Oct. 25, we intend to contact the Court to pursue a resolution.

Plaintiffs' First Set of Interrogatories

- Extended Product Numbers. Plaintiffs' position is that identification of extended product numbers is relevant to establishing infringement, at least for so long as there is no signed representative products stipulation between the parties. NVIDIA's position is that identifying extended product numbers is not relevant, because the technical documentation is

maintained at the product family-level (e.g., GF101). You said that you would investigate whether NVIDIA is willing to provide extended product numbers for the accused products. As I have said multiple times, including as early as the July 31 Rule 26(f) conference, Plaintiffs are more than willing to enter into a written stipulation on representative products. We await your response.

- Code Names. Plaintiffs' position is that NVIDIA should identify prerelease code names associated with each of the accused products, to the extent any exist. You represented that the family-level code names in NVIDIA's responses to interrogatories nos. 1 and 2 constitute a good-faith list of code names and that NVIDIA does not have any additional code names to identify at this time.
- Downstream Products. You represented that NVIDIA will supplement its responses to identify NVIDIA downstream products, as requested by the interrogatories. You said that you need to check with your client to determine when NVIDIA will be able to do this.
- Interrogatory No. 1: Design Rules ('941/'236 Patents). You represented that NVIDIA will produce design rules as part of its core technical document production due on Nov. 21, 2019. (Dkt. 25 ¶ 3(b)(ii).) You further represented that NVIDIA tentatively agrees to identify design rule documents as requested by interrogatory no. 1, subject to an agreement by Plaintiffs to identify documents in response to interrogatories propounded by NVIDIA.
- Interrogatory No. 2: Package Type ('005 Patent). You represented that NVIDIA will supplement its interrogatory response to identify the package type for the accused products.
- Interrogatory No. 2: HBM Supplier ('005 Patent). Plaintiffs' position is that the HBM stack is relevant to the '005 Patent because it provides one of the "plurality of device chips" as recited in the preamble of claim 1, for example. Because the HBM stack is relevant to NVIDIA's infringement of the '005 Patent, the identity of the supplier of the HBM stack is also relevant. Plaintiffs have a need to learn now the identities of suppliers of HBM stacks to NVIDIA because Plaintiffs may wish to seek discovery from the suppliers, and the suppliers may be located overseas, which could require additional time for discovery. You said that you did not understand why the HBM stack is relevant. You said that you would provide Plaintiffs' explanation of relevance to NVIDIA and see if NVIDIA is willing to identify the companies that supply it with HBM stacks.
- Interrogatory No. 3 ('333 Patent). As noted in Plaintiffs' deficiency letter of Oct. 1, NVIDIA's Aug. 31 response to interrogatory no. 3 does not identify any products or list any of the information requested by the interrogatory. We ask that you supplement your response to identify the accused products.
 - o During our meet and confer, you stated that NVIDIA intends to produce documents containing information requested by interrogatory no. 3 when NVIDIA serves its core technical document production by Nov. 21, 2019. Plaintiffs' position is that the core technical document production deadline does not relieve NVIDIA of its obligation to provide a response to interrogatory no. 3, which Plaintiffs served on NVIDIA eleven

weeks ago on July 30, 2019. Similar to the issue with the HBM stacks and the '005 Patent, Plaintiffs have a need to learn now the identity of suppliers to NVIDIA of substrates and circuit boards that are used in the '333 Accused Products, as well as the identity of the entities that assemble these components to create the '333 Accused Products. Plaintiffs may wish to seek discovery from these suppliers and assemblers, many of which may be located overseas.

o In response to Plaintiffs' position, you stated that NVIDIA is collecting and reviewing documents, and that you would investigate whether NVIDIA can respond to interrogatory no. 3 with the names of the suppliers. Plaintiffs reiterate that they need supplier and assembler information soon (well before Nov. 21), and that this information does not constitute core technical documentation that is not due until Nov. 21.

- Interrogatory No. 4 ('046 Patent). As noted in Plaintiffs' deficiency letter of Oct. 1, NVIDIA's Aug. 31 response to interrogatory no. 4 does not identify any products or list any of the information requested by the interrogatory. You confirmed that NVIDIA's production of core technical documentation will include circuit schematics. You also said that you are checking with NVIDIA regarding a supplemental response for interrogatory no. 4 that identifies specific products. You also confirmed that NVIDIA will supplement its response to interrogatory no. 4 to identify NVIDIA downstream products.
- Interrogatory No. 5 (Top 10 NVIDIA Customers). You represented that NVIDIA is still investigating and considering its response to interrogatory no. 5. Plaintiffs' position is that NVIDIA should remedy its deficient interrogatory response through supplementation by Oct. 25, 2019.
- Interrogatory No. 6 (Financial Data). You represented that NVIDIA is working on preparing a spreadsheet that will provide detailed financial information and that NVIDIA expects to produce soon. You indicated that this spreadsheet would contain quarterly unit and revenue information. You could not state whether it would also include the information called for by subparts (d)-(g), but noted that you would discuss this with your client.
- Interrogatory No. 7 (First Awareness). You confirmed that NVIDIA will supplement its response to interrogatory no. 7 to identify "who was involved or has knowledge" of NVIDIA's first awareness of the asserted patents.
- Interrogatory No. 13 (Licenses). You represented that NVIDIA is investigating the information requested by interrogatory no. 13 and that until NVIDIA completes this investigation, NVIDIA is not in a position to describe what it will provide in a supplemental response. Plaintiffs reiterated that, as an initial matter, NVIDIA should produce the executed licenses that pertain to the accused products.

Plaintiffs' First Set of Requests for Production

- "Sold for Shipment into the United States." As noted in Plaintiffs' deficiency letter of Oct. 1, NVIDIA stated in response to request nos. 41, 42, 46, 47, 48, 59, and 79 that it will produce

documents “sufficient to show summary of sales information as kept in the ordinary course of business for the products specifically accused of infringement that were sold for shipment into the United States during the relevant time period in its possession, custody or control, that can be located after a reasonable search.” Plaintiffs' deficiency letter of Oct. 1 requested a detailed explanation from NVIDIA regarding the sales data that it intends to produce, including an explanation regarding the meaning of the phrase “sold for shipment into the United States.” During our meet and confer call, you were not able to describe the criteria NVIDIA is applying to its data to determine what does or does not constitute a sale “for shipment into the United States.” You stated that you understand Plaintiffs' request for an explanation of the criteria. Please provide Plaintiffs with this information.

- Additional RFPs. The parties agreed to schedule another call to continue discussing the issues identified in Plaintiffs' Oct. 1 deficiency letter. As we discussed, please provide time(s) for a follow-up call this week.

Best regards,
Tom

From: Garten, Thomas E <tgarten@cov.com>
Sent: Sunday, October 13, 2019 10:03 AM
To: Williamson, Carrie <carrie.williamson@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
 Carrie: We'll speak with you on Monday 10/14 at 1:00 PM PT. I will circulate a conference line.
 Best regards,
 Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>
Sent: Friday, October 11, 2019 10:36 AM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]
 Tom,
 We aren't available during those times. We can be available on Monday sometime between 11am – 2:30pm PT.
 Thanks,
 Carrie

From: Garten, Thomas E <tgarten@cov.com>
Sent: Wednesday, October 9, 2019 6:50 AM
To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Carrie: We are available from 2:30 - 6:00 PM Pacific on Thursday 10/10 or 2:30 - 4:30 PM Pacific on Friday 10/11. Please select a time.

Thanks,

Tom

From: Garten, Thomas E <tgarten@cov.com>

Sent: Saturday, October 05, 2019 5:15 AM

To: Williamson, Carrie <carrie.williamson@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence

Thank you, Carrie. We do expect NVIDIA to be prepared to meet and confer before the close of next week. Please provide some time slots for the call.

Best regards,

Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>

Sent: Thursday, October 03, 2019 5:35 PM

To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Tom,

With respect to your request to meet and confer regarding the issues in your October 1 letter, we are still reviewing and investigating issues in your letter and will get back with you regarding a time to meet and confer next week.

Regards,

Carrie

From: Garten, Thomas E <tgarten@cov.com>

Sent: Tuesday, October 1, 2019 8:24 PM

To: NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Fowler, Mark <Mark.Fowler@us.dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>

Subject: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Counsel: Please see the attached correspondence regarding deficiencies in NVIDIA's responses to Plaintiffs' first set of interrogatories and document requests.

Best regards,

Tom

Thomas Garten

Covington & Burling LLP
3000 El Camino Real, 5 Palo Alto Square, 10th Floor
Palo Alto, CA 94306-2112
T +1 650 632 4708 | tgarten@cov.com
www.cov.com

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Exhibit 12

From: Williamson, Carrie
To: [Garten, Thomas E](#); [Kraft, Denise](#); [Brian Farnan](#); [Michael J. Farnan](#); [Xperi-NVIDIA](#)
Cc: [Fowler, Mark](#); [NVIDIA-Tessera-DLA](#); [Wynn-Grant, Asa](#)
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Date: Tuesday, December 10, 2019 6:07:11 PM

[EXTERNAL]

Tom,

It is entirely unreasonable to send a new, substantive meet and confer email on a Thursday evening at 11:36pm PT (Friday morning at 2:36am ET for our respective Delaware counsel) and expect us to meet and confer with you within one business day after receipt and to provide further supplemental responses in 3 business days following receipt of your e-mail. Plaintiffs' request is particularly unreasonable given our 75-page supplemental responses provided on November 27. We are discussing with our client the issues you raised in your new e-mail below and will respond in writing to those issues in a reasonable time period.

Regards,
 Carrie

From: Garten, Thomas E
Sent: Monday, December 9, 2019 12:22 PM
To: Kraft, Denise ; Brian Farnan ; Michael J. Farnan ; Xperi-NVIDIA
Cc: Williamson, Carrie ; Fowler, Mark ; NVIDIA-Tessera-DLA
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

We have not received a response to this email. As mentioned below, we are available today to meet and confer.

From: Garten, Thomas E <tgarten@cov.com>
Sent: Thursday, December 05, 2019 11:36 PM
To: Kraft, Denise <denise.kraft@dlapiper.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Xperi-NVIDIA <xperi-nvidia@cov.com>
Cc: Williamson, Carrie <carrie.williamson@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
 Counsel for NVIDIA:

We write regarding ongoing deficiencies in NVIDIA's responses to Plaintiffs' first set of interrogatories. As the record below reflects, Plaintiffs have made clear the various ways in which NVIDIA's interrogatory responses are deficient. Unfortunately, NVIDIA's November 27, 2019 supplemental interrogatory responses, served at NVIDIA's insistence on the eve of Thanksgiving, did not cure many of these deficiencies. The ongoing deficiencies include:

- **Interrogatory No. 2:** The supplemental response remains deficient for the reasons raised by Plaintiffs previously, including most recently on November 14. NVIDIA's response merely states that [REDACTED]

[REDACTED] Please associate the supplier of HBM for *each* accused product model (e.g., by associating the supplier with each NVIDIA GP100 and GV100 NVIDIA Chip NVPN). The information NVIDIA has provided hardly goes beyond the disclosure in NVIDIA's 2019 10-K at

page 9, [REDACTED]
[REDACTED].

- **Interrogatory No. 3:** More than 4 months after NVIDIA was served with this interrogatory, NVIDIA still has not identified *any* accused part numbers -- instead stating that "[i]nformation responsive to this interrogatory is identified in the charts provided in Interrogatory No. 1." This is a non-response. The information provided in response to Interrogatory No. 1 is not sufficient for Plaintiffs to discern each and every '333 Accused Product (per Plaintiffs' definition of that term), at least because the response to Interrogatory No. 1 does not identify the package type of each product identified in the charts. NVIDIA also has not provided the information called for in subparts (c)-(g) of the interrogatory. We identified these deficiencies two months ago, and most recently on November 14. The documents identified by NVIDIA, pursuant to Rule 33(d), do not appear to be responsive to the interrogatory [REDACTED]. Further, pointing to source code folders SC000002 and SC000004, without more specificity, does not comply with Rule 33(d). *See, e.g., Power Integrations, Inc. v. Fairchild Semiconductor, Int'l, Inc.*, 2005 WL 8136574, at *1 (D. Del. Oct. 11, 2005).
- **Interrogatory No. 4:** NVIDIA's supplemental response does not associate a circuit schematic (e.g., by file name or other similar designation) with each GPU and SOC product, as called for by subpart (d). Pointing to source code folder SC000003\tessera, without more specificity, does not comply with Rule 33(d). *See, e.g., Power Integrations*, 2005 WL 8136574, at *1.
- **Interrogatory No. 5:** On November 6, 2019, NVIDIA promised "to identify its top customers and their products to the extent NVIDIA has the information." On November 14, Plaintiffs indicated that such a response would be deficient. The interrogatory does not seek a listing of "top customers" generally, but rather calls for an identification of the Downstream Products sold by NVIDIA's Top 10 Customers on an annual basis. NVIDIA's supplemental response merely lists ten "NVIDIA Corp." customers. It does not identify the Top 10 Customers on an annual basis, nor does it identify any Downstream Products. NVIDIA has simply made no real effort to provide the requested information. The identification of top customers on an annual basis should be available in NVIDIA's financial database and the Downstream Product information would be known to NVIDIA's sales teams, which operate to achieve "design-wins" with respect to specific products. Indeed, some of this information is provided on NVIDIA's website. *See, e.g.,* <https://www.nvidia.com/en-us/data-center/tesla/tesla-qualified-servers-catalog/>.
- **Interrogatory No. 6:** On November 6, 2019, NVIDIA stated that it would "supplement this interrogatory to provide unit and revenue information and [] to provide COGS as the information as held in the ordinary course of business. We can provide this information by November 27." Then, on November 27, NVIDIA failed to supplement Interrogatory No. 6, stating that "[g]iven the number of products and the scope of the financial information over an extended period of time, the preparation of the financial reports is unfortunately taking longer than expected" and that NVIDIA would supplement "soon." Thus, Plaintiffs still have no response to this interrogatory 4 months after it was served.
- **Interrogatory No. 13:** NVIDIA's supplemental response identified three license agreements. As we advised by email on November 14, limiting the production to agreements that "cover[] the relevant accused functionalities for the asserted patents" is unduly restrictive. NVIDIA has provided no justification for this restriction. As set forth in Plaintiffs' October 1

letter, and as discussed during the October 14 telephone call, Plaintiffs' position is that -- as an initial matter -- NVIDIA must produce the executed licenses that pertain to the accused products. This would include at least the following license agreements (originals and renewals):

- o Samsung: <https://nvidianews.nvidia.com/news/nvidia-and-samsung-agree-to-settle-all-outstanding-ip-litigation-6622432>
- o Intel: <https://nvidianews.nvidia.com/news/intel-to-pay-nvidia-technology-licensing-fees-of-1-5-billion>
- o Polaris: <http://www.wilan.com/news/news-releases/news-release-details/2019/WiLAN-Subsidiary-Polaris-Signs-License-Agreement-with-NVIDIA/default.aspx>
- o Rambus: <https://www.rambus.com/rambus-and-nvidia-sign-patent-license-agreement-2/>, <https://www.law360.com/articles/307685/rambus-inks-patent-licensing-deal-with-nvidia>
- o Fast Logic: <https://www.alliacense.com/nvidia-purchases-fast-logic-portfolio-license-2/>

In addition, NVIDIA should produce materials related to its own GPU licensing campaign, which launched in 2013, including NVIDIA's proposed royalty rates and any license agreements reached as a result of that campaign. *See, e.g.*, <https://www.cnet.com/news/nvidia-to-license-its-graphics-technology-to-device-makers/>; <https://www.fool.com/investing/general/2013/12/29/nvidias-gpu-licensing-plan-is-clever.aspx>.

Given that these deficiencies have been outstanding now for some time, and Plaintiffs worked diligently over the past two months in an attempt to resolve these disputes, we expect NVIDIA to cure each one of the deficiencies above in a supplemental response to be provided on Wednesday, December 11. We are generally available on Monday, December 9 for a meet-and-confer involving Delaware counsel. If the deficiencies are not cured, we intend to raise each one of the issues above with the Court.

Best regards,
Tom

From: Garten, Thomas E <tgarten@cov.com>

Sent: Thursday, November 14, 2019 6:07 PM

To: Kraft, Denise <denise.kraft@dlapiper.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Xperi-NVIDIA <xperi-nvidia@cov.com>

Cc: Williamson, Carrie <carrie.williamson@dlapiper.com>; Fowler, Mark <mark.fowler@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence Carrie and Denise:

As the record demonstrates, we have been forced to move toward contacting the Court in order to extract any meaningful information from NVIDIA regarding (a) the timing of NVIDIA's proposed supplementation, and (b) the content of NVIDIA's proposed supplementation. Thank you for finally providing *some* of this information in your November 6 email.

First, let me point out that NVIDIA's November 1, 2019 supplemental responses to Interrogatory Nos. 2-4 did little to cure the deficiencies in NVIDIA's responses to those interrogatories. This was not "significant supplementation," as described in Denise's email.

- **Interrogatory No. 2:** NVIDIA merely stated that [REDACTED]

Exhibit 13

From: [Garten, Thomas E](#)
 To: [Williamson, Carrie](#); [Kraft, Denise](#); [Brian Farnan](#); [Michael J. Farnan](#); [Xperi-NVIDIA](#)
 Cc: [Fowler, Mark](#); [NVIDIA-Tessera-DLA](#); [Wynn-Grant, Asa](#)
 Subject: RE: Invenas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
 Date: Wednesday, December 18, 2019 11:22:40 AM

Carrie:

The record of correspondence speaks for itself and demonstrates that NVIDIA has thus far been unwilling to meet and confer with Plaintiffs. Also, your suggestion that these "issues" are new, requiring lengthy consultation with your client, is simply not credible. NVIDIA has been on notice of these issues for months. This includes Plaintiffs' position with regard to the production of license agreements: we informed you on October 31 and November 14 that Plaintiffs expect NVIDIA to produce license agreements covering the Accused Products, and we took issue with NVIDIA's statement that it would produce agreements that "cover[] the relevant accused functionalities for the asserted patents" on the ground that such an interpretation is unduly restrictive. We asked NVIDIA to provide authority to support its position, and NVIDIA has provided none. The "specific licenses" identified in my December 5 email are merely examples of the types of agreements and documents that we believe are encompassed by Interrogatory No. 13 -- and are clearly within the scope of what we previously demanded. NVIDIA has obviously been aware of these licenses for some time.

We will join the meet and confer on Friday at 10:30 AM Pacific. To facilitate our discussion -- and so there is no confusion about what Plaintiffs are demanding -- we provide a list of issues that we expect NVIDIA to address on the phone call. **We will ask that NVIDIA cure these deficiencies by**

12/27.

- **Interrogatory No. 2:** The supplemental response remains deficient for the reasons raised by Plaintiffs previously, including most recently on November 14. NVIDIA's response merely states that [REDACTED]

[REDACTED] The information NVIDIA has provided hardly goes beyond the disclosure in NVIDIA's 2019 10-K at page 9, [REDACTED]

- o QUESTION: Will NVIDIA supplement by 12/27 to specifically associate the supplier of HBM for *each* accused product model (e.g., by associating the supplier with each NVIDIA GP100 and GV100 NVIDIA Chip NVPN)?

- **Interrogatory No. 3:** More than 4 months after NVIDIA was served with this interrogatory, NVIDIA still has not identified *any* accused part numbers -- instead stating that "[i]nformation responsive to this interrogatory is identified in the charts provided in Interrogatory No. 1." This is a non-response. The information provided in response to Interrogatory No. 1 is not sufficient for Plaintiffs to discern each and every '333 Accused Product (per Plaintiffs' definition of that term), at least because the response to Interrogatory No. 1 does not identify the package type of each product identified in the charts. NVIDIA also has not provided the information called for in subparts (c)-(g) of the interrogatory. We identified these deficiencies two months ago, and most recently on November 14. The documents identified by NVIDIA, pursuant to Rule 33(d), do not appear to be responsive to the interrogatory (e.g., [REDACTED]). Further, pointing to source code folders SC000002 and SC000004, without more specificity, does not

comply with Rule 33(d). *See, e.g., Power Integrations, Inc. v. Fairchild Semiconductor, Int'l, Inc.*, 2005 WL 8136574, at *1 (D. Del. Oct. 11, 2005).

o QUESTION: Will NVIDIA supplement by 12/27 to (1) specifically identify all NVIDIA devices that satisfy the definition of '333 Accused Product, (2) provide the information called for in subparts (c)-(g), and (3) if NVIDIA intends to rely on Rule 33(d), provide an identification of specific files within SC000002 and SC000004?

- **Interrogatory No. 4:** NVIDIA's supplemental response does not associate a circuit schematic (e.g., by file name or other similar designation) with each GPU and SoC product, as called for by subpart (d). Pointing to source code folder SC000003\tessera, without more specificity, does not comply with Rule 33(d). *See, e.g., Power Integrations*, 2005 WL 8136574, at *1.

o QUESTION: Will NVIDIA supplement by 12/27 to specifically associate a circuit schematic (by file name or similar designation) with each accused GPU and SoC, as called for by subpart (d)?

- **Interrogatory No. 5:** On November 6, 2019, NVIDIA promised "to identify its top customers and their products to the extent NVIDIA has the information." On November 14, Plaintiffs indicated that such a response would be deficient. The interrogatory does not seek a listing of "top customers" generally, but rather calls for an identification of the Downstream Products sold by NVIDIA's Top 10 Customers on an annual basis. NVIDIA's supplemental response merely lists ten "NVIDIA Corp." customers. It does not identify the Top 10 Customers on an annual basis, nor does it identify any Downstream Products. NVIDIA has simply made no real effort to provide the requested information. The identification of top customers on an annual basis should be available in NVIDIA's financial database and the Downstream Product information would be known to NVIDIA's sales teams, which operate to achieve "design-wins" with respect to specific products. Indeed, some of this information is provided on NVIDIA's website. *See, e.g.,* <https://www.nvidia.com/en-us/data-center/tesla/tesla-qualified-servers-catalog/>.

o QUESTION: Will NVIDIA supplement by 12/27 to specifically identify the Downstream Products sold by NVIDIA's Top 10 Customers on an annual basis?

- **Interrogatory No. 6:** On November 6, 2019, NVIDIA stated that it would "supplement this interrogatory to provide unit and revenue information and [] to provide COGS as the information as held in the ordinary course of business. We can provide this information by November 27." Then, on November 27, NVIDIA failed to supplement Interrogatory No. 6, stating that "[g]iven the number of products and the scope of the financial information over an extended period of time, the preparation of the financial reports is unfortunately taking longer than expected" and that NVIDIA would supplement "soon." Nearly a month later, NVIDIA still has not produced its financial data and has offered no explanation for its delay.

o QUESTIONS: Will NVIDIA supplement and produce financial data by 12/27, for each and every accused product, covering the period of May 8, 2013 to the present, that identifies on a monthly basis: (a) number of units sold and sales price, (b) total revenue, (c) total costs, (d) name/address of the person to whom the products were sold, (e) name/address of the person that paid for the products, (f) name/address of the person to whom the products were delivered, (g) name/address of the end customer, and (f) projected number of units to be sold and projected sales price? I understand that NVIDIA had previously agreed to provide (a), (b), and (c) as held in the ordinary course of business. NVIDIA previously raised questions about the

relevance of (d)-(f), which we addressed by email. Let me be clear: to the extent NVIDIA possesses the information called for by (d)-(f), we expect it to be produced. If NVIDIA intends to maintain a relevance objection, please say so.

- **Interrogatory No. 13:** NVIDIA's supplemental response identified three license agreements. As we advised by email on November 14, limiting the production to agreements that "cover[] the relevant accused functionalities for the asserted patents" is unduly restrictive. NVIDIA has provided no justification for this restriction. As set forth in Plaintiffs' October 1 letter, and as discussed during the October 14 telephone call, Plaintiffs' position is that -- as an initial matter -- NVIDIA must produce the executed licenses that pertain to the accused products. This would include at least the following license agreements (originals and renewals):

- o QUESTIONS: By no later than 12/27, Will NVIDIA supplement and produce *all* executed license agreements that pertain to the accused products, including without limitation the agreements with Samsung, Intel, Polaris, Rambus, and Fast Logic? Will NVIDIA also produce materials relating to its own GPU licensing campaign, including NVIDIA's proposed royalty rates and any license agreements reached as a result of that campaign?

Best regards,
Tom

From: Williamson, Carrie

Sent: Tuesday, December 17, 2019 8:59 PM

To: Garten, Thomas E ; Kraft, Denise ; Brian Farnan ; Michael J. Farnan ; Xperi-NVIDIA

Cc: Fowler, Mark ; NVIDIA-Tessera-DLA ; Wynn-Grant, Asa

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence

[EXTERNAL]

Tom,

Your e-mail is an intentional misrepresentation of the status of the parties' communications. We have never been unwilling to meet and confer. I told you in my December 10 e-mail below that we were discussing these issues with our client and we would provide a response in a reasonable time period. I further told you during our Wednesday December 11 verbal meet and confer on other issues that we were discussing the issues with our client and we would provide a response. It has been just 7 business days since you raised these issues, including new requests regarding production of specific licenses.

We can be available to meet and confer with you on Friday between 10:30am -12pm PT. We expect to discuss both the issues in your e-mail as well as the issues in my December 10 letter to you regarding the deficiencies with Plaintiffs' interrogatory responses.

Regards,
Carrie

From: Garten, Thomas E <tgarten@cov.com>

Sent: Tuesday, December 17, 2019 4:41 PM

To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; Kraft, Denise <denise.kraft@us.dlapiper.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Xperi-NVIDIA <xperi-nvidia@cov.com>

Cc: Fowler, Mark <Mark.Fowler@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence

[EXTERNAL]

Carrie: It has now been more than ten days since our request to meet and confer regarding NVIDIA's deficient interrogatory responses, and NVIDIA still has not made itself available to discuss the issues that we have now raised multiple times dating back to October. We intend to write the Court tomorrow morning, advising the Court that NVIDIA has been unwilling to meet and confer and has made no promises to cure the deficiencies raised by Plaintiffs, and will seek an order setting a discovery hearing or compelling a meet a confer by Thursday 12/19.

Best regards,

Tom

From: Garten, Thomas E <tgarten@cov.com>

Sent: Wednesday, December 11, 2019 10:48 AM

To: Williamson, Carrie <carrie.williamson@dlapiper.com>; Kraft, Denise <denise.kraft@dlapiper.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Xperi-NVIDIA <xperi-nvidia@cov.com>

Cc: Fowler, Mark <mark.fowler@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
Carrie:

These are not new issues. We raised these deficiencies in a letter dated October 1, held a meet and confer via telephone on October 14 involving Delaware counsel, and have had numerous written exchanges thereafter. NVIDIA has dragged its feet, has insisted that there are no "disputes" because NVIDIA promised to provide substantive supplemental interrogatory responses, and then failed to deliver on those promises. The fact that your supplemental response is 75-pages is irrelevant. 50 of those pages consist of tables identifying NVIDIA's infringing products for the 231/946 patents in response to Interrogatory No. 1. I did not mention Interrogatory No. 1 in my December 5 email. Please provide a time to meet and confer on the issues raised in my December 5 email before COB Friday, December 13.

Best regards,

Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>

Sent: Tuesday, December 10, 2019 6:05 PM

To: Garten, Thomas E <tgarten@cov.com>; Kraft, Denise <denise.kraft@dlapiper.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Xperi-NVIDIA <xperi-nvidia@cov.com>

Cc: Fowler, Mark <mark.fowler@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>; Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
[EXTERNAL]

Tom,

It is entirely unreasonable to send a new, substantive meet and confer email on a Thursday evening at 11:36pm PT (Friday morning at 2:36am ET for our respective Delaware counsel) and expect us to meet and confer with you within one business day after receipt and to provide further supplemental responses in 3 business days following receipt of your e-mail. Plaintiffs' request is particularly unreasonable given our 75-page supplemental responses provided on November 27. We are discussing with our client the issues you raised in your new e-mail below and will respond in writing to those issues in a reasonable time period.

Exhibit 14

From: Williamson, Carrie
 To: [Garten, Thomas E](#); [Kraft, Denise](#); [Brian Farnan](#); [Michael J. Farnan](#); [Xperi-NVIDIA](#)
 Cc: [Fowler, Mark](#); [NVIDIA-Tessera-DLA](#); [Wynn-Grant, Asa](#)
 Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence
 Date: Sunday, December 22, 2019 11:26:22 PM

[EXTERNAL]

Tom,

I write following our Friday, December 20 meet and confer. As I stated during the call, it is premature for Plaintiffs to contact the Court regarding an unripe dispute. Involving the Court in an unripe dispute is a misuse of Court resources, and it circumvents the plain language of Local Rule 7.1.1 and the Court's discovery dispute procedure. Local Rule 7.1.1 requires the parties make a reasonable effort to reach agreement. NVIDIA is and has been attempting in good faith to reach agreement, but Plaintiffs are not.

Indeed, during our December 20 meet and confer conference (our first discussion since providing our supplemental interrogatory responses), **for each of the 6 interrogatories we discussed extensively during the meet and confer, I told you that we would need to discuss with our client and get back to you or we would supplement, including a proposal to supplement certain responses in early January** (on a date *earlier than* you had agreed to supplement your own interrogatory responses in January). As such, there is no dispute with respect to NVIDIA's interrogatory responses for the Court to resolve at this time. Despite this fact, you indicated on the call that if NVIDIA's counsel will not participate in a call to the Court on Monday, December 23, Plaintiffs will improperly bypass the Court's requirements in the Scheduling Order and Local Rules by writing a letter to the Court regarding unknown, unripe discovery issues.

Contrary to your claim below, our December 20 meet and confer focused largely on new issues (e.g., Plaintiffs' questions and issues with NVIDIA's supplemental interrogatory responses). **Plaintiffs' unreasonably demanded** – for the first time on Wednesday, December 18 and before any meet and confer occurred – **that NVIDIA provide supplemental interrogatory responses by December 27, two days following the Christmas holiday**, a time when you are well aware, people are traveling and unavailable.

Contacting the Court on Monday, December 23 allows NVIDIA's counsel no business days to communicate with our client following this first December 20 meet and confer and as such is unreasonable, harassing and does not reflect a reasonable or good faith effort to reach agreement. Moreover, Plaintiffs' demand that NVIDIA supplement its responses by December 27 allows just three business days after our meet and confer during the holiday week when people are traveling and unavailable is not a reasonable effort to reach agreement. Indeed, Plaintiffs' demand to involve the Court in these unripe disputes during the holiday period is particularly unreasonable given that there is nearly 1 year remaining in the discovery period as discovery closes December 10, 2020 and the date to substantially complete document production is August 19, 2020.

Given there is no existing dispute with respect to NVIDIA's discovery responses, **Plaintiffs must engage in reasonable meet and confer, including allowing appropriate time to discuss with our client, before involving the Court**, consistent with the Scheduling Order and Local Rules.

Regards,
 Carrie

From: Garten, Thomas E

Sent: Wednesday, December 18, 2019 11:23 AM

To: Williamson, Carrie ; Kraft, Denise ; Brian Farnan ; Michael J. Farnan ; Xperi-NVIDIA

Cc: Fowler, Mark ; NVIDIA-Tessera-DLA ; Wynn-Grant, Asa

Subject: RE: Invensas Corp. et al. v. NVIDIA Corp., No. 1:19-cv-00861-RGA – Correspondence

[EXTERNAL]

Carrie:

The record of correspondence speaks for itself and demonstrates that NVIDIA has thus far been unwilling to meet and confer with Plaintiffs. Also, your suggestion that these "issues" are new,

Exhibit 15

From: Ouchida, Laurie
To: [Brian Farnan](#); [Michael Farnan](#); [Xperi-NVIDIA](#)
Cc: [NVIDIA-Tessera-DLA](#)
Subject: NVIDIA/Invensas - 01/17/20 L. Ouchida letter to Thomas Garten
Date: **Friday, January 17, 2020** 2:41:50 PM
Attachments: [2020.01.17 - Ouchida ltr to Garten.pdf](#)

[EXTERNAL]

Enclosing Defendant NVIDIA Corp.'s document production, bearing Bates numbers NVIDIA-0047246-NVIDIA-0047289 (NVIDIA-005). The password for the production zip file will be sent separately.

ShareFile link: <https://dlapiper.sharefile.com/f/fo2315b4-fc94-4950-9404-2cd93520845c>

Best regards,

Laurie Ouchida

Case Manager

T +1 650.833.2113

F +1 650.833.2001

E laurie.ouchida@us.dlapiper.com



DLA Piper LLP (US)

2000 University Avenue

East Palo Alto, California 94303-2215

United States

www.dlapiper.com

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Exhibit 16

From: Ouchida, Laurie
To: [Brian Farnan](#); [Michael Farnan](#); [Xperi-NVIDIA](#)
Cc: [NVIDIA-Tessera-DLA](#)
Subject: NVIDIA/Invensas - 02/06/20 L. Ouchida letter to Thomas Garten
Date: Thursday, February 06, 2020 2:21:01 PM
Attachments: [2020.02.06 - Ouchida ltr to Garten.pdf](#)

[EXTERNAL]

Enclosing Defendant NVIDIA Corp.'s document production, bearing Bates numbers NVIDIA-0047290-NVIDIA-0047315 (NVIDIA-006). The password for the production zip file will be sent separately.

ShareFile link: <https://dlapiper.sharefile.com/f/fo2315b4-fc94-4950-9404-2cd93520845c>

Best regards,

Laurie Ouchida

Case Manager

T +1 650.833.2113

F +1 650.833.2001

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Exhibit 17

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

INVENSAS CORPORATION and TESSERA
ADVANCED TECHNOLOGIES, INC.,

Plaintiffs,

v.

NVIDIA CORPORATION,

Defendant.

C.A. NO. 19-00861-RGA

JURY TRIAL DEMANDED

**RESTRICTED – OUTSIDE
ATTORNEYS EYES ONLY**

**DEFENDANT NVIDIA CORPORATION’S SUPPLEMENTAL RESPONSES AND
OBJECTIONS TO PLAINTIFFS’ FIRST SET OF INTERROGATORIES (NO. 3, 5, 6, 13)**

Pursuant to Rules 26 and 33 of the Federal Rules of Civil Procedure (“F.R.C.P.”), Defendant NVIDIA Corporation (“NVIDIA”) provides these supplemental responses to the First Set of Interrogatories (No. 3, 5, 6 and 13) by Plaintiffs Invensas Corporation and Tessera Advanced Technologies, Inc. (collectively, “Plaintiffs”) as follows:

GENERAL STATEMENT AND OBJECTIONS

1. NVIDIA objects to each interrogatory, definition and instruction to the extent that it seeks to impose duties or obligations on NVIDIA beyond those set forth in the Federal Rules of Evidence, F.R.C.P., the Local Rules of Civil Practice and Procedure of the United States District Court for the District of Delaware (“Delaware Local Rules”), the Court’s orders or any agreement reached between the parties. In this regard, to the extent that an interrogatory requires, explicitly or implicitly, the construction of one or more patent claim terms, the comparison of the asserted claims and the prior art, NVIDIA’s positions regarding non-infringement, information regarding core technical documents, or sales information before Plaintiffs’ service of sufficient identification of accused products, such interrogatory is premature

- [REDACTED]

2018

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

2019

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

NVIDIA is continuing to investigate what information it possesses regarding the products that these customers sell that incorporate the specific products purchased from NVIDIA during the respective years identified.

Discovery is just beginning and NVIDIA reserves the right to supplement or amend this interrogatory as additional information is known.

INTERROGATORY NO. 6

Separately for each NVIDIA Accused Product from May 8, 2013 to the present, identify the (a) number of units sold and the sales price for those units on a monthly basis; (b) total revenue that you derived from such sales; (c) total costs of such sales, including incremental costs; (d) name and address of the person to whom those products were sold based on how the sale was booked by NVIDIA; (e) name and address of the person that paid for those products based on NVIDIA's receipt of payment; (f) name and address of the person to whom those products were delivered; (g) name and address of the end customer; and (h) projected number of units to be sold and the projected sales price for those units on a monthly or quarterly basis.

ANSWER TO INTERROGATORY NO. 6

NVIDIA objects to this interrogatory on the grounds set forth in its General Statement and Objections above, and hereby incorporates these by reference as if fully set forth herein.

NVIDIA objects to this interrogatory on the grounds that it is overly broad as to time. NVIDIA objects to this interrogatory on the grounds that it seeks information regarding products that are outside the scope of this case. NVIDIA objects to this interrogatory on the ground that it is overly broad, unduly burdensome and compound. NVIDIA objects to this interrogatory to the extent it seeks information that is neither relevant, nor reasonably calculated to lead to the discovery of admissible evidence. NVIDIA objects to this interrogatory on the grounds that it seeks information that are outside NVIDIA's possession, custody and control or that is not maintained in the ordinary course of business. NVIDIA objects to this interrogatory to the extent that it seeks disclosure of confidential information from third parties that NVIDIA is under an obligation not to disclose. NVIDIA will disclose such information subject to any required third party consent or permission and pursuant to the Protective Order to be entered in this case.

NVIDIA objects to this interrogatory to the extent it requires disclosure of information regarding specific customers of any products. NVIDIA objects to this interrogatory to the extent that it seeks to elicit information subject to and protected by the attorney-client privilege, the attorney work product doctrine, joint defense or common interest privilege and/or any other applicable privileges, protections, or immunities. NVIDIA objects to this interrogatory on the ground that the term "NVIDIA Accused Product" is overly broad, unduly burdensome, vague and ambiguous. NVIDIA further objects to this interrogatory to the extent it seeks financial information in a form not held by NVIDIA. NVIDIA objects to this interrogatory to the extent it seeks disclosure of confidential information from third parties that NVIDIA is under an

obligation not to disclose. NVIDIA objects to this interrogatory as to the terms and phrases “total costs,” “incremental costs” “name and address of the person to whom those products were sold based on how the sale was booked by NVIDIA” “name and address of the person that paid for those products based on NVIDIA’s receipt of payment,” “name and address of the person to whom those products were delivered,” “name and address of the end customer,” and “projected number of units to be sold and the projected sales price for those units on a monthly or quarterly basis.” NVIDIA specifically objects to these subparts as separate interrogatory requests.

Subject to and without waiving the foregoing general and specific objections, NVIDIA responds as follows:

Pursuant to F.R.C.P. 33(d), information responsive to this interrogatory may be derived or ascertained from the following documents: NVIDIA-0047264 – NVIDIA-0047264; NVIDIA-0047265 – NVIDIA-0047265; NVIDIA-0047266 – NVIDIA-0047266; NVIDIA-0047267 – NVIDIA-0047267; NVIDIA-0047268 – NVIDIA-0047268; NVIDIA-0047269 – NVIDIA-0047269; NVIDIA-0047270 – NVIDIA-0047270; NVIDIA-0047271 – NVIDIA-0047271; NVIDIA-0047272 – NVIDIA-0047272; NVIDIA-0047273 – NVIDIA-0047273; NVIDIA-0047274 – NVIDIA-0047274; NVIDIA-0047275 – NVIDIA-0047275; NVIDIA-0047276 – NVIDIA-0047276; NVIDIA-0047277 – NVIDIA-0047277; NVIDIA-0047278 – NVIDIA-0047278; NVIDIA-0047279 – NVIDIA-0047279; NVIDIA-0047280 – NVIDIA-0047280; NVIDIA-0047281 – NVIDIA-0047281; NVIDIA-0047282 – NVIDIA-0047282; NVIDIA-0047283 – NVIDIA-0047283; NVIDIA-0047284 – NVIDIA-0047284; NVIDIA-0047285 – NVIDIA-0047285; NVIDIA-0047286 – NVIDIA-0047286; NVIDIA-0047287 – NVIDIA-0047287; NVIDIA-0047288 – NVIDIA-0047288; NVIDIA-0047289 – NVIDIA-0047289; NVIDIA-0047290 – NVIDIA-0047290; NVIDIA-0047291 – NVIDIA-0047291; NVIDIA-

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Discovery is just beginning and NVIDIA reserves the right to supplement or amend this interrogatory as additional information is known.

INTERROGATORY NO. 13

For each proposed, offered, or executed license to intellectual property or technology of which you are aware that concerns or relates to the NVIDIA Accused Products or that you contend is relevant to the calculation of a reasonable royalty for any one of the Asserted Patents, identify the proposed, offered, or executed license and all related documents, describe (on a quarter-by-quarter basis) any payments or receipts pursuant to such license, and indicate which, if any, such license you contend is relevant to the calculation of a reasonable royalty for the Asserted Patents.

Dated: February 14, 2020

Of Counsel:

Mark D. Fowler (*Admitted Pro Hac Vice*)
Clayton Thompson (*Admitted Pro Hac Vice*)
Alan Limbach (*Admitted Pro Hac Vice*)
Yakov Zolotorev (*Admitted Pro Hac Vice*)
Carrie L. Williamson (*Admitted Pro Hac Vice*)
Asa Wynn-Grant (*Admitted Pro Hac Vice*)
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DLA PIPER LLP (US)

/s/ Brian A. Biggs

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*Attorneys for Defendant NVIDIA
Corporation*

CERTIFICATE OF SERVICE

I, Brian Biggs, hereby certify that on this 14th day of February, 2020, I caused a true and correct copy of the foregoing **DEFENDANT NVIDIA CORPORATION'S SUPPLEMENTAL SUPPLEMENTAL RESPONSES AND OBJECTIONS TO PLAINTIFFS' FIRST SET OF INTERROGATORIES (NO. 3, 5, 6, 13)** to be sent to the following counsel of record via electronic mail:

Brian E. Farnan
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/s/ Brian A. Biggs
Brian A. Biggs (DE Bar No. 5591)

Exhibit 18

From: Williamson, Carrie
To: [Garten, Thomas E](#); [NVIDIA-Tessera-DLA](#)
Cc: [Xperi-NVIDIA](#); [Brian Farnan](#); [Michael J. Farnan](#)
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues
Date: Wednesday, April 08, 2020 12:20:08 PM
Attachments: 4-8 NVIDIA Portion - Invensas v. NVIDIA - Joint Letter.docx

[EXTERNAL]

Tom,

Please see our portion of the joint letter.

Regards,
Carrie

From: Garten, Thomas E <tgarten@cov.com>
Sent: Tuesday, April 7, 2020 2:22 PM
To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues

[EXTERNAL]

Carrie: As you know, the parties informed the court yesterday that the joint letter brief will be filed on Friday, 4/10. Please provide your section by COB tomorrow. Thanks

From: Garten, Thomas E <tgarten@cov.com>
Sent: Friday, April 03, 2020 1:46 PM
To: Williamson, Carrie <carrie.williamson@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues

Carrie: Our argument, as presented, is directly relevant to the double-counting issue and largely repeats information that I previously conveyed to you during our telephonic meet and confers. You've now had our letter for 10 days. We're awaiting your promised update. We further are reserving the right to simply file our argument unilaterally.

Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>
Sent: Wednesday, April 01, 2020 7:48 PM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J.

March , 2020

VIA E-FILING

The Honorable Richard G. Andrews
J. Caleb Boggs Federal Building
844 N. King Street
Unit 9, Room 6325
Wilmington, DE 19801-3555

FILED UNDER SEAL

Re: Invensas Corporation, et al. v. NVIDIA Corporation (C.A. 19-cv-861-RGA)

Dear Judge Andrews,

We write to provide the additional information requested by the Court in connection with the issues addressed at the January 23, 2020 discovery conference and in the parties' February 21, 2020 joint status report (D.I. 110). In its March 2, 2020 Order (D.I. 117), the Court ordered: (1) Plaintiffs to "supply the narrative supplemental interrogatory response for the two products" with respect to Plaintiffs' Interrogatory No. 3; and (2) with respect to Plaintiffs' Interrogatory No. 6, "Plaintiffs are requested to more fully explain how double-counted sales might arise, and Defendant[] [is] requested to explain how specifically they propose to resolve the double counting issue."

A. Interrogatory No. 3: Accused Product Information for the '333 Patent

Plaintiffs attach Defendant NVIDIA Corporation's ("NVIDIA") narrative supplemental response to Interrogatory No. 3. *See* Ex. A. NVIDIA further supplemented its response to Interrogatory No. 3 on March 16. *See* Ex. B.

B. Interrogatory No. 6: Sales Data

Plaintiffs' Interrogatory No. 6 asks NVIDIA to provide, among other things, an identification of the person to whom each accused product was sold and delivered and the ultimate end customer. The parties outline their respective positions to respond to the Court's request below.

Plaintiffs' Statement

The identity of NVIDIA's customers and end-customers—and data tying specific sales to those customers—is relevant to Plaintiffs' claim that NVIDIA is liable for inducing its customers to make infringing sales in the United States. *See, e.g.*, D.I. 1 (Complaint) at ¶¶ 44, 52. NVIDIA should produce this information because it is directly relevant to Plaintiffs' inducement claim, and because NVIDIA would not be burdened by the production of this information.

First, the identity of NVIDIA’s customers and end-customers is relevant because it will allow Plaintiffs to determine a complete and accurate count of infringing sales in the United States. NVIDIA has not produced complete financial data. Instead, NVIDIA has limited its financial production to data reflecting sales that NVIDIA has “allocated” to the United States. But this “allocated” data is based on where products are initially billed rather than where products are actually sold and shipped; thus, it does not give a full picture of the infringing sales made in the United States. NVIDIA acknowledged in its SEC filings that the allocated data may undercount the true number of NVIDIA products that are ultimately sold in a particular region such as the United States:

Revenue by geographic region is allocated to individual countries based on the location to which the products are initially billed *even if the revenue is attributable to end customers in a different location.*

See Ex. [REDACTED] (2019 10-K) at 30 (emphasis added). In other words, NVIDIA’s “allocation” accounting method may have attributed sales to Asia, Europe, or other locations “even if the revenue is attributable to end customers [in the United States].” *Id.* NVIDIA’s refusal to provide customer and end-customer information for each sale prevents Plaintiffs from discovering the full extent of NVIDIA’s United States sales and thus its full indirect infringement liability.

The following example illustrates the problem. NVIDIA partners with companies headquartered around the globe, such as Micro-Star Int’l Co. Ltd. (“MSI”), to sell graphics cards and gaming laptops in the United States and abroad that include infringing NVIDIA semiconductor chips. See, e.g., Ex. [REDACTED]¹ (commemorating sales of over 100 million MSI NVIDIA graphics cards worldwide); Ex. [REDACTED] (<https://videocardz.net/browse/msi>) (listing hundreds of graphics cards sold under NVIDIA’s “GeForce” brand). Plaintiffs allege that NVIDIA is liable for inducing any such downstream infringing sales made in the United States. Plaintiffs have independently identified relevant downstream products and issued a subpoena to MSI (and several other NVIDIA partner companies) seeking data reflecting United States sales of products that contain the infringing NVIDIA chips. NVIDIA’s general “allocated” financial data does not indicate whether it includes any United States sales of MSI graphics cards containing NVIDIA chips (or the number of any such sales). Plaintiffs need to verify the true number of such sales, and should not be left to guess at whether (or to what extent) such sales are (or are not) already accounted for in the financial spreadsheets that NVIDIA has produced in this litigation showing sales that NVIDIA has “allocated” to the United States. NVIDIA should identify its customers and end customers, and produce the straightforward data identifying the sales it has made to those customers and end-customers.

Second, it would not be burdensome for NVIDIA to disclose the identity of its customers and end-customers. NVIDIA admitted in another case that its financial accounting system is capable of reporting financial data “in the ordinary course of business” that includes “sales order number, part number, customer name, end-customer name, invoice number, ship-to name,

¹ <https://us.msi.com/news/detail/4cfc66283e21a6e68d1563a45949bf7c>

customer type, product identifier, product type, product family, product business unit, quantity, amount of sale, unit price, any rebate, cost per unit, total cost, invoice date, and much more.” *BIAX Corp. v. NVIDIA Corp.*, 271 F.R.D. 200, 210 (D. Colo. Sept. 21, 2010). It likely takes more effort and expense for NVIDIA to extract this information from its production of financial data than it would take for NVIDIA to simply include the data that it maintains in the ordinary course of business. NVIDIA does not appear to dispute these facts.

For these reasons, Plaintiffs respectfully request an order requiring NVIDIA to produce the available data that identifies the customer name, customer type, end-customer name, and ship-to name for each infringing sale.

Defendant’s Statement

Plaintiffs’ characterization of Defendant NVIDIA Corporation’s financial production is incorrect. Despite the Court’s direction during the January 23 in-person hearing that Plaintiffs should understand what has been produced before bringing an issue back to Court (1/23/20 Tr. at 61), Plaintiffs have not asked questions or otherwise conferred with Defendant regarding the financial information produced on January 17 and February 6, 2020. Instead, Plaintiffs incorrectly speculate regarding that production. Plaintiffs’ argument also goes well beyond the Court’s request for an explanation of “how double-counted sales may arise” (D.I. 117). For these reasons and as described below, Plaintiffs’ request should be denied.

First, Plaintiffs incorrectly claim Defendant limited its financial production to data reflecting sales “allocated” to the United States. This is incorrect—there was no such allocation. Defendant’s production encompasses *all* of its sales of accused products since May 2013, regardless of where the products were shipped.

Second, Plaintiffs’ reliance on the cited SEC filing is misplaced because it encompasses financial information for companies in addition to Defendant NVIDIA Corporation, as is reflected in the SEC filing. Again, Defendant already produced financial information for *all* of its sales of the accused products regardless of shipping location.

Third, once Defendant sells a product to its customer, it does not have control over the flow of that product from that customer through sales to end users. With respect to Plaintiffs’ example regarding MSI, Plaintiffs fail to account for the fact that MSI (and other similar companies) has purchased GPUs from companies other than Defendant. To the extent that Plaintiffs are concerned about double-counting, once the companies that Plaintiffs have subpoenaed produce U.S. sales data for products including an accused NVIDIA chipset, Defendant can determine whether any of its sales were to the subpoenaed company and notify Plaintiff of those sales. That information also would resolve the points that Plaintiffs make about both inducement its inducement claim.

Fourth, Plaintiffs raise a “burden” argument that is both incorrect and non-responsive to the Court’s request regarding explanation for double-counting. The threshold issue is not whether it is burdensome, but whether *all* customer names for *every* sale from 2013 to 2019 are relevant and proportional to the needs of the case. Fed. R. Civ. P. 26(b). It is not. *See, e.g.,*

BASCOM Global Internet Svcs. v. AT&T, 14-cv-3942 2017 WL 11490077, at *3 (N.D. TX July 13, 2017) (denying motion to compel customer names). Plaintiffs previously indicated that not every customer name is relevant as during the January 23 in-person discovery conference, There, Plaintiffs argued that they needed top customer names “to focus our third-party discovery.” (1/23/20 Tr. at 56.) Consequently, the Court asked Defendant to provide its five biggest customers, (*id.*) which Defendant provided for each year from 2013 to 2019. Plaintiffs already have served subpoenas to seven purported customers, [REDACTED]

[REDACTED] As such, Defendant’s concern that Plaintiffs will unnecessarily disturb its customers is real and justified. Moreover, contrary to Plaintiffs’ claim, production of all customer names as Plaintiffs request is, in fact, burdensome to Defendant because it would take significant effort for Defendant to prepare new spreadsheets identifying all customers for every sale from 2013 – 2019.

In conclusion, for the reasons explained above, Defendant respectfully requests the Court deny Plaintiffs’ request for “an order requiring NVIDIA to produce the available data that identifies the customer name, customer type,² end-customer name, and ship-to name.” Defendant has explained specifically how it proposes to resolve any double counting issue in a manner that provides proportional information to Plaintiffs.

Respectfully submitted,

/s/ *DRAFT*

Brian E. Farnan
Counsel for Plaintiffs

/s/ *DRAFT*

Denise S. Kraft
Counsel for Defendant

² Plaintiffs’ Interrogatory No. 6 does not seek “customer type.”

Exhibit 19

From: [Garten, Thomas E](#)
To: [Williamson, Carrie](#); [NVIDIA-Tessera-DLA](#)
Cc: [Xperi-NVIDIA](#); [Brian Farnan](#); [Michael J. Farnan](#)
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues
Date: [Wednesday, April 08, 2020](#) 5:49:39 PM

Carrie:

We're surprised by the following assertion: "Plaintiffs incorrectly claim Defendant limited its financial production to data reflecting sales "allocated" to the United States. This is incorrect—there was no such allocation. Defendant's production encompasses all of its sales of accused products since May 2013, regardless of where the products were shipped." In its discovery responses and in any meet and confer in which the issue of NVIDIA's financial data has been discussed, NVIDIA has communicated that it would not produce worldwide sales and that it would limit its production of financial data to products "sold for shipment into the United States." [REDACTED]

This requires a discussion prior to the filing of the joint letter. Please confirm that you are available for a meet and confer tomorrow at 1:30 PM Pacific.

Tom

From: Williamson, Carrie <carrie.williamson@dlapiper.com>
Sent: Wednesday, April 08, 2020 12:20 PM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues

[EXTERNAL]

Tom,

Please see our portion of the joint letter.

Regards,
Carrie

From: Garten, Thomas E <tgarten@cov.com>
Sent: Tuesday, April 7, 2020 2:22 PM
To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues

[EXTERNAL]

Exhibit 20

From: Williamson, Carrie
To: [Garten, Thomas E](#); [NVIDIA-Tessera-DLA](#)
Cc: [Xperi-NVIDIA](#); [Brian Farnan](#); [Michael J. Farnan](#)
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues - RESTRICTED - OUTSIDE ATTORNEYS' EYES ONLY INFORMATION
Date: Monday, April 13, 2020 9:30:03 PM

[EXTERNAL]

CONTAINS RESTRICTED – OUTSIDE ATTORNEYS' EYES ONLY INFORMATION

Tom,

NVIDIA Corporation's financial spreadsheets produced in the litigation include [REDACTED]. To address your last question, and in order to resolve this dispute and for the purpose of this litigation only, Defendant is willing to agree that all of the sales listed in the spreadsheets that have been produced occurred within the United States.

[REDACTED]

Regards,
Carrie

From: Garten, Thomas E <tgarten@cov.com>
Sent: Friday, April 10, 2020 4:29 PM
To: Williamson, Carrie <Carrie.Williamson@us.dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Order re: Discovery Issues

[EXTERNAL]

Carrie:

In your letter brief and during our meet and confer, you represented that the financial data the NVIDIA has produced in this action reflects all of NVIDIA Corporation's sales of accused products since May 2013, regardless of where the products were shipped. It is the case, however, that NVIDIA Corporation's sales are only made for shipment to the United States? In other words, is it the case that -- in actuality -- the financial data that you have produced reflects only sales of products shipped to the United States? If not, and NVIDIA Corporation's sales during the relevant period include sales of products shipped outside of the United States, then how does the data produced by NVIDIA allow Plaintiffs or Defendant to determine precisely which sales are made "within the United States" per 35 U.S.C. § 271(a)?

We would appreciate a prompt response.

Best regards,
Tom

Exhibit 21

**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2013 to 12/31/2013 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 4 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
11/6/2013	EXDO6911090073	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	242.00	KG	21.00	CTN
7/30/2013	EXDO6911071527	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	302.00	KG	25.00	CTN
7/23/2013	PFSKOAK13070018	ASI CORP.	NVIDIA SINGAPORE PTE LTD.	SAID TO CONTAIN COMPUTER GRAPHICS CARD 8 6 CTNS PACKED IN 3 PALLETS	HONG KONG	OAKLAND,CA	505.00	K	86.00	CTN
5/10/2013	EXDO6911056160	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	910.00	KG	199.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

Country of Origin - HS code

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**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2014 to 12/31/2014 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 15 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
12/15/2014	EXDO6911160406	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE LTD	COMPUTER GRAPHICS CARDS	HONG KONG	LOS ANGELES,CA	989.00	KG	69.00	CTN
11/15/2014	EXDO6911155348	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	205.00	KG	20.00	CTN
8/27/2014	EXDO6911139124	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	852.00	KG	68.00	CTN
8/19/2014	EXDO6911136952	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GRAPHIC CARDS	CHINA	LONG BEACH,CA	1,720.00	KG	400.00	CTN
8/2/2014	EXDO6911134426	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD FOR COMPUTER	HONG KONG	OAKLAND,CA	2,400.00	KG	79.00	CTN
7/25/2014	EXDO6911133478	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	1,960.00	KG	400.00	CTN
7/25/2014	EXDO6911133476	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	1,890.00	KG	400.00	CTN
7/24/2014	EXDO6911133479	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	1,930.00	KG	400.00	CTN
7/19/2014	EXDO6911132326	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD FOR E-GOODS	HONG KONG	OAKLAND,CA	2,404.00	KG	80.00	CTN
7/15/2014	EXDO6911132256	NVIDIA CORPORATION C/O FOXCONN EMS	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	787.00	KG	71.00	CTN
7/11/2014	EXDO6911130665	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	2,005.00	KG	400.00	CTN
7/11/2014	EXDO6911130185	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD FOR E-GOODS	HONG KONG	OAKLAND,CA	2,415.00	KG	80.00	CTN

5/3/2014	BRAENYC0055746	AMERCIA II ELECTRONICS	NVIDIA SINGAPORE PTE LTD	PLYWOOD PALLETS) ELECTRONICS DETECT DEVICES ADP POWER SUPPLY INDUCTORS,BLUETHO OTH MODULE,TANTALUM CAPACITO ALUMINUM	HONG KONG	NEW YORK/NEWARK AREA, NEWARK, NEW JERSEY	637.00	K	159.00	CTN
4/4/2014	EXDO6911113056	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	178.00	KG	19.00	CTN
1/3/2014	EXDO6911099151	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	188.00	KG	20.00	CTN

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Source: U.S. Customs and Border Protection (CBP)

Country of Origin - HS code

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**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2015 to 12/31/2015 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 2 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
6/22/2015	EXDO6490059923	EXPONENT, INC.	NVIDIA SINGAPORE PTE, LTD	DANGEROUS GOODS AS PER ATTACHED SHIPPERS DANGEROUS GOODS TRANSPORT	NETHERLANDS	BOSTON,MA	5.00	KG	1.00	PCS
6/1/2015	EXDO6911184456	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARD	HONG KONG	OAKLAND,CA	4,104.00	KG	760.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

Country of Origin - HS code

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**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2016 to 12/31/2016 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 4 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
12/11/2016	EXDO6911267146	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	3,596.00	KG	756.00	CTN
11/30/2016	SCZE801160679	AMERICA II ELECTRONICS INC.	NVIDIA SINGAPORE PTE, LTD.	ELECTRONIC COMPONENTS (111 CTNS S.T.C. 4 PLT S)	HONG KONG	LONG BEACH,CA	596.00	KG	111.00	CTN
6/12/2016	EXDO6911239739	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHIC CARD	HONG KONG	OAKLAND,CA	1,389.00	KG	141.00	CTN
1/20/2016	EXDO6911221868	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE LTD-HK BRANCH	COMPUTER GRAPHICS CARD	HONG KONG	LONG BEACH,CA	1,282.00	KG	128.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

Country of Origin - HS code

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**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2017 to 12/31/2017 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 17 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
10/27/2017	EXDO6911311650	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	8,044.00	KG	480.00	CTN
10/20/2017	EXDO6911310215	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,810.00	KG	480.00	CTN
9/23/2017	EXDO6911305971	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	8,022.00	KG	480.00	CTN
9/23/2017	EXDO6911305965	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	8,020.00	KG	480.00	CTN
9/17/2017	EXDO6911304673	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,795.00	KG	480.00	CTN
9/17/2017	EXDO6911304671	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND/OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,728.00	KG	480.00	CTN
7/29/2017	EXDO6911298372	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM	HONG KONG	OAKLAND,CA	11,826.00	KG	480.00	CTN
7/15/2017	EXDO6911295852	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND THEREOF	HONG KONG	OAKLAND,CA	11,817.00	KG	480.00	CTN
6/10/2017	EXDO6911291070	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND / OR PARTS THEREOF	HONG KONG	OAKLAND,CA	1,221.00	KG	48.00	CTN
6/10/2017	EXDO6911290511	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND / OR PARTS THEREOF	HONG KONG	OAKLAND,CA	11,772.00	KG	480.00	CTN
5/12/2017	EXDO6911286829	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD	HONG KONG	OAKLAND,CA	4,363.00	KG	176.00	CTN
5/12/2017	EXDO6911286439	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	SHIELD	HONG KONG	OAKLAND,CA	8,744.00	KG	352.00	CTN

5/7/2017	EXDO6911285643	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	3,950.00	KG	840.00	CTN
4/29/2017	EXDO6490071083	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD	LITHIUM ION BATTERIES HS: 850440 847330 950450 HS: 900490 847130 392890	NETHERLAND S	NEW YORK/NEWARK AREA, NEWARK, NEW JERSEY	200.00	KG	1.00	PCS
2/27/2017	EXDO6490070101	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD	LITHIUM ION BATTERIES HS: 850440 847330 950450 392690 847130 900490 950450	NETHERLAND S	NEW YORK/NEWARK AREA, NEWARK, NEW JERSEY	165.00	KG	1.00	PCS
2/19/2017	EXDO6911277658	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	COMPUTER GRAPHICS CARDS	HONG KONG	OAKLAND,CA	3,847.00	KG	840.00	CTN
1/15/2017	EXDO6911272463	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM AND PARTS THEREOF	HONG KONG	OAKLAND,CA	6,000.00	KG	240.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

Country of Origin - HS code

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Email: contact@datamyne.com

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**USA Bills Import HOUSES**

Data available from: 01/01/2004 to 05/13/2020

USA Bills Import HOUSES : 01/01/2018 to 12/31/2018 where : In Transit : No AND Entire B/L : "nvidia singapore**"

Found 6 results

Date	Bill of lading Nbr.	Consignee Declared	Shipper Declared	Short Container Description	Country of Origin	Port of Arrival	Weight	Weight Unit	Quantity	Quantity Unit
12/9/2018	EXDO6911363546	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM	HONG KONG	OAKLAND,CA	9,902.00	KG	480.00	CTN
10/23/2018	EXDO6911357007	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	VIDEO GAME ASSMBLY	HONG KONG	OAKLAND,CA	10,071.00	KG	480.00	CTN
10/11/2018	EXDO6911356636	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	VIDEO GAME ASSMBLY	HONG KONG	OAKLAND,CA	8,186.00	KG	480.00	CTN
9/22/2018	EXDO6911352904	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM	HONG KONG	OAKLAND,CA	8,249.00	KG	480.00	CTN
9/5/2018	EXDO6911351011	NVIDIA CORPORATION	NVIDIA SINGAPORE PTE, LTD.	GAMING SYSTEM THEREOF SHIELD ANDROID TV GAME CONSOLE	HONG KONG	OAKLAND,CA	10,046.00	KG	482.00	CTN
2/2/2018	EXDO6911321964	AMERICA II ELECTRONICS INC.	NVIDIA SINGAPORE PTE LTD	ELECTRONIC COMPONENT ELECTRONIC COMPONENT	HONG KONG	JACKSONVILL E,FL	4,670.00	KG	888.00	CTN

Obs.: DATA SUBJECT TO MODIFICATIONS

Source: U.S. Customs and Border Protection (CBP)

Country of Origin - HS code

www.datamyne.com[Email: contact@datamyne.com](mailto:contact@datamyne.com)[2005-2020 Datamyne - Terms of Use](#)

Exhibit 22

From: [Garten, Thomas E](#)
To: [NVIDIA-Tessera-DLA](#)
Cc: [Xperi-NVIDIA](#); [Brian Farnan](#); [Michael J. Farnan](#)
Subject: RE: Invensas v. NVIDIA - Request for Meet and Confer
Date: [Wednesday, June 03, 2020](#) 3:32:20 PM

Carrie:

Please confirm that counsel for NVIDIA will be available to meet and confer during one of the proposed time slots on Thursday or Friday of this week. I gave you the full day on Friday, so we shouldn't have any trouble connecting. In addition, please note that we have added a fifth item to the agenda (shown below in red text).

Best regards,
Tom

From: Garten, Thomas E <tgarten@cov.com>
Sent: Friday, May 29, 2020 2:39 PM
To: NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Brian Farnan <bfarnan@farnanlaw.com>; Michael J. Farnan <mfarnan@farnanlaw.com>
Subject: Invensas v. NVIDIA - Request for Meet and Confer

Carrie:

I write to request a meet and confer regarding NVIDIA's failure to address numerous discovery deficiencies raised by Plaintiffs over the past two months. In each instance, not only has NVIDIA failed to address the deficiencies, but NVIDIA has failed to articulate its positions or meaningfully engage with Plaintiffs at all. We are available for a meet and confer on 6/4 before 11:00 AM Pacific and on 6/5 all day. The issues that we intend to cover are listed below.

1. Plaintiffs' October 3, 2019 Rule 30(b)(6) Deposition Notice to NVIDIA. This notice was served 8 months ago. NVIDIA waited nearly 50 days to serve its objections and responses, and in those responses NVIDIA did not agree to produce a witness on any topic. We have met and conferred with you by telephone at least 4 times regarding this notice -- each time, it took weeks to get you on the phone. We expect you to provide the names of the deponents and deposition dates on our next call. If you cannot do that, we intend to involve the court.
2. Plaintiffs' April 26, 2020 Letter re: Deficiencies in NVIDIA's Document Production. NVIDIA made its core technical document production on 11/21. Excluding prior art and IPR petitions, the only documents that NVIDIA has produced since 11/21 are those that were the subject of Plaintiffs' January 2020 discovery letter to the court (e.g., license agreements, sales data). On 4/26 we raised numerous categories of documents that need to be produced and asked NVIDIA to respond in writing with its positions. Please provide a written response to this letter before the meet and confer.

3. Plaintiffs' May 5 & 7, 2020 Requests for NVIDIA to Identify Which GBT, MSI and Zotac Sales are Encompassed by NVIDIA's Existing Production of Financial Data. In the 4/29 joint discovery letter, NVIDIA represented that "once the companies Plaintiffs have subpoenaed produce U.S. sales data for products including an NVIDIA chipset, Defendant can notify Plaintiffs which of the accused chips were sold by Defendant." On 5/5 and 5/7, we provided you with the productions of U.S. sales data made by GBT, MSI, and Zotac and asked NVIDIA to supplement its response to Interrogatory 6 to provide the information promised in the 4/29 joint discovery letter. We've received no response from you. If NVIDIA has not supplemented its response to Interrogatory 6 to account for GBT, MSI, and Zotac sales by the time of our call, then please come prepared with a date certain for this supplement.
4. Plaintiffs' May 18, 2020 Letter re: Deficiencies in NVIDIA's Invalidity Contentions. On 5/18 we wrote regarding deficiencies in NVIDIA's invalidity contentions. We also requested that NVIDIA reduce the total number of prior art references to no more than 25 references across the four asserted patents. Please cure the deficiencies and reduce the number of prior art references by 6/1, as requested. If NVIDIA does not agree to do so, then we ask that you provide a written response to our letter before the meet and confer.
5. Plaintiffs' Motion for Leave to Amend the Complaint. Plaintiffs will move for leave to amend the complaint to add the two wholly-owned NVIDIA Corporation subsidiaries as defendants. We would like to meet and confer with you to obtain NVIDIA's position on this motion. As part of that discussion, we expect to also cover NVIDIA's continued insistence that the identities of these two subsidiaries, and their involvement with respect to the accused products, is NVIDIA's confidential information that cannot be disclosed to the public.

Best regards,
Tom

Thomas Garten

Covington & Burling LLP
3000 El Camino Real, 5 Palo Alto Square, 10th Floor
Palo Alto, CA 94306-2112
T +1 650 632 4708 | tgarten@cov.com
www.cov.com

COVINGTON

Exhibit 23

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended January 27, 2019

OR

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

Commission file number: 0-23985



NVIDIA

NVIDIA CORPORATION

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
Incorporation or Organization)

94-3177549
(I.R.S. Employer
Identification No.)

2788 San Tomas Expressway
Santa Clara, California 95051
(408) 486-2000

(Address, including zip code, and telephone number, including area code, of principal executive offices)
Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
Common Stock, \$0.001 par value per share	The Nasdaq Global Select Market

Securities registered pursuant to Section 12(g) of the Act:
None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See definitions of "large accelerated filer", "accelerated filer", "smaller reporting company", and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☒ Accelerated filer ☐ Non-accelerated filer ☐ Smaller reporting company ☐ Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes ☐ No ☒

The aggregate market value of the voting stock held by non-affiliates of the registrant as of July 27, 2018 was approximately \$146.66 billion (based on the closing sales price of the registrant's common stock as reported by the Nasdaq Global Select Market on July 27, 2018). This calculation excludes 26 million shares held by directors and executive officers of the registrant. This calculation does not exclude shares held by such organizations whose ownership exceeds 5% of the registrant's outstanding common stock that have represented to the registrant that they are registered investment advisers or investment companies registered under section 8 of the Investment Company Act of 1940.

The number of shares of common stock outstanding as of February 15, 2019 was 606 million.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for its 2019 Annual Meeting of Shareholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K are incorporated by reference into Part III, Items 10-14 of this Annual Report on Form 10-K.

LIST OF REGISTRANT'S SUBSIDIARIES

Subsidiaries of Registrant (All 100% owned)**Country of Organization**

Icera LLC	United States
Icera Semiconductor LLC	United States
JAH Venture Holdings, Inc.	United States
LPN Facilitator LLC	United States
NVIDIA (BVI) Holdings Limited	Virgin Islands, British
NVIDIA ARC GmbH	Germany
NVIDIA Brasil Computação Visual Limitada	Brazil
NVIDIA Development France SAS	France
NVIDIA Development UK Limited	England and Wales
NVIDIA Development, Inc.	Canada
NVIDIA Dutch B.V.	Netherlands
NVIDIA Entertainment Devices (Shanghai) Co., Ltd	China
NVIDIA FZ-LLC	United Arab Emirates
NVIDIA GK	Japan
NVIDIA Global Ltd	Virgin Islands, British
NVIDIA GmbH	Germany
NVIDIA Graphics Holding Company	Mauritius
NVIDIA Graphics Private Limited	India
NVIDIA Hong Kong Development Limited	Hong Kong
NVIDIA Hong Kong Holdings Limited	Hong Kong
NVIDIA International Holdings Inc.	United States
NVIDIA International, Inc.	Cayman Islands
NVIDIA Israel Ltd.	Israel
NVIDIA Italy S.r.l.	Italy
NVIDIA Ltd.	England and Wales
NVIDIA Poland sp.z o.o	Poland
NVIDIA Pty Limited	Australia
NVIDIA Semiconductor (Shenzhen) Co., Ltd.	China
NVIDIA Semiconductor Holding Company	Mauritius
NVIDIA Semiconductor R&D (Tianjin) Co., Ltd.	China
NVIDIA Semiconductor Shenzhen Holding Company	Mauritius
NVIDIA Semiconductor Technical Service (Shanghai) Co., Ltd.	China
NVIDIA Semiconductor Technology (Shanghai) Co., Ltd.	China
NVIDIA Singapore Development Pte. Ltd.	Singapore
NVIDIA Singapore Pte Ltd	Singapore
NVIDIA Switzerland AG	Switzerland
NVIDIA Technical Service (Beijing) Co., Ltd.	China
NVIDIA Technology UK Limited	England and Wales
NVIDIA, Helsinki Oy	Finland
VC Worldwide Ltd.	Virgin Islands, British

Exhibit 24

From: Wynn-Grant, Asa
To: [Garten, Thomas E](#); [NVIDIA-Tessera-DLA](#)
Cc: [Xperi-NVIDIA](#); [Michael J. Farnan](#); [Brian Farnan](#)
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter
Date: Wednesday, May 06, 2020 10:34:54 AM
Attachments: [image001.png](#)

[EXTERNAL]

Hi Tom:

The fact that [REDACTED] is confidential information. Characterizing those as "worldwide" sales, necessarily discloses confidential information regarding NVIDIA Corporation's sales. Furthermore, the fact that [REDACTED] [REDACTED] is confidential information – not just the names of those subsidiaries. The fact that revenue may be attributable to other subsidiaries is not the same thing as saying that [REDACTED].

-Asa

From: Garten, Thomas E <tgarten@cov.com>
Sent: Wednesday, May 6, 2020 9:15 AM
To: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[EXTERNAL]

Thanks, Asa. Please explain why (a) the fact that NVIDIA Corporation produced "worldwide" sales data is confidential information that must be redacted, and (b) [REDACTED] [REDACTED] is confidential information that must be redacted. As to (b), you took the position during our meet and confer that statements within the NVIDIA Corporation 10-K filings place everyone on notice -- including Plaintiffs -- that some revenues are attributable to subsidiaries. In addition, it is public that all of the subsidiaries listed in the 10-K are "wholly owned."

From: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>
Sent: Wednesday, May 06, 2020 8:45 AM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[EXTERNAL]

Tom:

Attached please find proposed additional redactions to Plaintiffs' version.

Thanks,

Asa

From: Garten, Thomas E <tgarten@cov.com>

Sent: Tuesday, May 5, 2020 4:39 PM

To: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>

Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[EXTERNAL]

Asa:

We object to these proposed redactions, which are overly broad and encompass a substantial amount of text that does not appear to contain any confidential information of NVIDIA Corporation. Please consider the attached version, which we believe to be more appropriate.

Regards,
Tom

From: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>

Sent: Tuesday, May 05, 2020 2:26 PM

To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>

Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>

Subject: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[EXTERNAL]

Counsel:

Attached please find proposed redactions to the parties' 4/29 joint letter. Please let us know if Plaintiffs have additional redactions for the public filing due tomorrow.

Regards,

Asa Wynn-Grant

Associate

T +1 650 833 2108
F +1 650 687 1227
Asa.Wynn-Grant@us.dlapiper.com

DLA Piper LLP (US)

dlapiper.com



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Exhibit 25

From: Wynn-Grant, Asa
To: [Garten, Thomas E](#); [NVIDIA-Tessera-DLA](#)
Cc: [Xperi-NVIDIA](#); [Michael J. Farnan](#); [Brian Farnan](#)
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter
Date: Thursday, May 07, 2020 8:25:11 AM
Attachments: [image002.png](#)
[Joint Letter re Discovery Disputes REDACTED 5.7.pdf](#)

[EXTERNAL]

Tom:

The Court's order does not make public the fact that NVIDIA's wholly owned subsidiaries [REDACTED]. The phrase "wholly owned subsidiaries" as used in the Court's order has no explicit connection with [REDACTED]. Further, as you know, at issue in this letter brief is not the question of whether NVIDIA has "global sales." [REDACTED]
[REDACTED]
[REDACTED]

In the interest of expediting this process, attached please see a letter adding two redactions to Plaintiffs' version (both additional redactions appear in the second to last paragraph on page 6).

Thanks,

Asa

From: Garten, Thomas E <tgarten@cov.com>
Sent: Wednesday, May 6, 2020 4:10 PM
To: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[EXTERNAL]

Asa:

We disagree that each reference to "worldwide" sales -- without more -- is confidential information, given that NVIDIA openly promotes itself as an international company with a global sales channel. NVIDIA Corporation also employs [executives](#) with responsibility for "global sales." With respect to subsidiaries, the Court's order on the discovery dispute already made this issue public. D.I. 140 at 2 (rejecting Plaintiffs' request for records from NVIDIA's "wholly owned subsidiaries"). Furthermore, the products that are accused in this case constitute substantially all of NVIDIA's product offerings during the relevant time period, so the information in the joint letter hardly goes beyond the public statement that at least some revenue covered by the 10-K is attributable to one or more of NVIDIA's subsidiaries. We would agree to the redaction of the specific names of the subsidiaries.

Regards,
Tom

From: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>
Sent: Wednesday, May 06, 2020 10:35 AM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[EXTERNAL]

Hi Tom:

The fact that [REDACTED] is confidential information. Characterizing those as "worldwide" sales, necessarily discloses confidential information regarding NVIDIA Corporation's sales. Furthermore, the fact that [REDACTED] [REDACTED] is confidential information – not just the names of those subsidiaries. The fact that revenue may be attributable to other subsidiaries is not the same thing as saying that [REDACTED].

-Asa

From: Garten, Thomas E <tgarten@cov.com>
Sent: Wednesday, May 6, 2020 9:15 AM
To: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[EXTERNAL]

Thanks, Asa. Please explain why (a) the fact that NVIDIA Corporation produced "worldwide" sales data is confidential information that must be redacted, and (b) [REDACTED] [REDACTED] is confidential information that must be redacted. As to (b), you took the position during our meet and confer that statements within the NVIDIA Corporation 10-K filings place everyone on notice -- including Plaintiffs -- that some revenues are attributable to subsidiaries. In addition, it is public that all of the subsidiaries listed in the 10-K are "wholly owned."

From: Wynn-Grant, Asa <asa.wynn-grant@dlapiper.com>
Sent: Wednesday, May 06, 2020 8:45 AM
To: Garten, Thomas E <tgarten@cov.com>; NVIDIA-Tessera-DLA <nvidia-tessera-dla@dlapiper.com>
Cc: Xperi-NVIDIA <xperi-nvidia@cov.com>; Michael J. Farnan <mfarnan@farnanlaw.com>; Brian Farnan <bfarnan@farnanlaw.com>
Subject: RE: Invensas v. NVIDIA - Proposed Redactions to 4/29 Joint Status Letter

[REDACTED]